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# ITA-AITES WTC 2023

Expanding Underground  
Knowledge & Passion to Make  
a Positive Impact on the World

**12-18  
MAY**

Megaron Athens International  
Congress Centre (MAICC)

**FINAL PROGRAM**

Organized by the



## Professional Congress Organizer



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# Welco

Dear Colleagues and Friends of the Tunnelling and Underground Space family,

It is with great pleasure, on behalf of the Greek Tunneling Society (GTS), to welcome you to the World Tunnel Congress 2023 that is held in Athens – Greece, from the 12th to the 18th May 2023. GTS is honoured and proud to host, for the first time ever, this outstanding event of the tunnelling community that is embraced with the participation of hundreds of consultants, contractors, software producers, machine / equipment manufacturers, investors, as well as operators and owners gathered in Athens to meet, exchange knowledge, promote their expertise / knowhow and define future needs.

The theme of ITA-AITES WTC 2023 Conference “EXPANDING UNDERGROUND” focuses on the Knowledge and Passion that our industry offers to Make a Positive Impact on the World, by means of the multiple advantages and solutions that underground space can provide. Indeed, cities, infrastructure and logistics expansion towards underground provide environmentally friendly, safe and resilient solutions that may facilitate the transformation of millions of people’s lives into a more sustainable lifestyle. This is becoming imperative as the globe is facing first-priority demanding challenges, such as (i) rapid urbanization, (ii) climate change and extreme weather phenomena, (iii) other natural hazards, (iv) need for sustainable energy geo-resources and (v) high demands for efficient people’s mobility and transportation of goods.

The congress covers all “hot” topics of the tunnelling and underground space industry. More than 420 papers from 45 different countries have been accepted

me



for publication, whereas the organizers' aim to ensure the highest possible scientific level was achieved thanks to the contribution of more than one hundred fifty (150) highly skilled professionals and academics coming from 29 countries. Their great effort in the reviewing process is highly acknowledged.

Timeless Athens, the birthplace of "symposia", provides the ideal conference host city and the meeting hub of the tunnelling and underground space professionals, thanks to its unique blend of history, culture, art, lifestyle and entertainment.

We strongly believe that WTC2023 in Athens (Greece) provides a valuable opportunity and a fertile soil for the international tunnelling and underground space engineering community to -literally- make a positive impact on the world. GTS is committed to organize a successful and memorable ITA-AITES World Tunnel Congress 2023 and offer what has been known as a traditional Greek hospitality.

*We welcome you to Athens!*



**Ioannis Fikiris**

*Chair of the Organizing Committee  
ITA - AITES World Tunnel Congress  
2023 / Athens*

# Media Partners



**Journal of  
Rock Mechanics and  
Geotechnical Engineering**



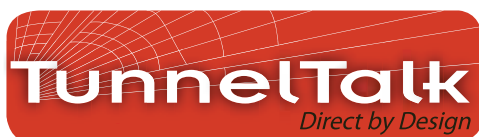
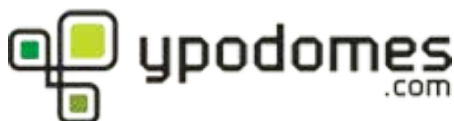
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Media Partners





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World Tunnel Congress 2023  
**EXPANDING UNDERGROUND**

15 - 17 May 2023  
Athens, Greece.





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TUNNELS**

# WTC2023 Committees

## Organizing Committee

### **Ioannis Fikiris**

Chair of the Organizing Committee

### **Ioannis Bakogiannis**

Organizing Committee co-Chair

### **Nikolaos Roussos**

President of Greek Tunnelling Society

### **Prof. George Anagnostou**

Scientific Committee Chair

### **Prof. Vassilis Marinou**

Program Committee co-Chair

### **Prof. Andreas Benardos**

Program Committee co-Chair

### **Evangelos Pergantis**

Schedule – Budget – Cost Control Chair

### **Dr. George Dounias**

Sponsorships & Exhibits Committee Chair

### **Dimitrios Alifragis**

Technical Visits Committee co-Chair

### **Dr. Paraskevi Yiouta-Mitra**

Technical Visits, Web & Media Communication Committee Co-Chair

### **Prof. Chrysothemis**

#### **Paraskevopoulou**

ITA-CET Training courses Committee Chair & Young Members group coordinator

### **Dr. George Leoutsakos**

Logistics and Venue Supervision Committee Chair

### **Marilia Balasi**

Marketing / Information Committee Chair

### **Chara Kalogeraki**

Marketing / Information Committee co-Chair

### **Dr. George Proutzopoulos**

Web & Media Communication Committee Chair

### **Konstantinos Kirytopoulos**

Registration, Hospitality & Delegates Services Chair

### **Dr. Dimitrios Litsas**

Social Program Committee Chair

### **George Doulikas**

Young Members group coordinator

### **em. Prof. Theodosios Tassios**

Scientific Counselor

### **Olivier Vion**

Executive Director ITA-AITES

# WTC2023 Committees

## ITA-AITES Executive Council

**Arnold Dix** (Australia)  
ITA-AITES / President  
(2022-2025)

**Jinxiu (Jenny) Yan** (China)  
ITA-AITES / Past President  
(2022-2025)

**Andres Marulanda**  
(Colombia)  
ITA-AITES / First Vice-  
President (2022-2025)

**Hangseok Choi** (Korea)  
ITA-AITES / Vice President  
(2022-2025)

**Jamal Rostami** (Iran)  
ITA-AITES / Vice President  
(2022-2025)

**Sindre Log** (Norway)  
ITA-AITES / Member  
(2022-2025)

**Damian McGirr** (UK)  
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(2022-2025)

**Monika Mitew-Czajewska**  
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**Andrea Pigorini** (Italy)  
ITA-AITES / Member  
(2022-2025)

**Klaus Rieker** (Germany)  
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(2022-2025)

**Sanja Zlatanic** (USA)  
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(2022-2025)

**Gerard Seingre**  
(Switzerland)  
ITA-AITES / Treasurer  
(2022-2025)

**Ioannis Fikiris** (Greece)  
ITA-AITES / Member  
(2020-2023) Correspondent  
WTC 2023

**Thomas Dalmalm** (Sweden)  
ITA-AITES / Member  
(2022-2025) Correspondent  
WTC 2023



# WTC2023 Committees

## Scientific Committee

**Prof. George Anagnostou** (Greece)  
WTC2023 Scientific Committee Chair

**Prof. Andreas Benardos** (Greece)  
WTC2023 Program Committee co-Chair

**Prof. Vassilis Marinos** (Greece)  
WTC2023 Program Committee co-Chair

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(The Netherlands)

**Zach Agjioutantis** (USA)

**Shinichi Akutagawa** (Japan)

**Dimitrios Alifragkis** (Greece)

**Giovanny Alvarado** (Australia)

**Jasmin Amberg** (Switzerland)

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**Ioannis Anastasopoulos**  
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**Georgios Angistalis** (Greece)

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(Greece)

**Pavlos Asteriou** (Greece)

**Stefanos Athanassopoulos**  
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**Tim Babendererde** (Germany)

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## Scientific Committee

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**R.K. Goel** (India)  
**Alexandre Gomes** (Australia)  
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# WTC2023 Committees

## Scientific Committee

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**Roberto Schuerch** (Switzerland)

**Gerard Seingre** (Switzerland)

**Keh-Jian Shou** (Chinese Taipei)

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**Jamie Standing** (UK)

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# Program Overview



## ITA-AITES WTC 2023

Expanding Underground  
Knowledge & Passion to Make  
a Positive Impact on the World

**12-18 May**

Megaron Athens International  
Congress Centre (MAICC)

[www.wtc2023.gr](http://www.wtc2023.gr)





# ITA-AITES PROGRAM & ITACET TRAINING COURSE

*Check ITA-AITES and  
ITACET Training Courses  
program online  
Scan the QR code*



Friday, 12 May, 2023

🕒 09:30 - 16:25

📍 Athens Chamber of Commerce and Industry

**ITACET Training Course***Risk management and sustainable underground solutions***Session 1: Risk management principles**

08:30 - 09:00	<b>Registration</b>
09:00 - 09:10	<b>Opening - Short - Introduction</b> Uni. Prof. Chrysothemis Paraskevopoulou
09:10 - 09:50	<b>How to handle risk in Subsurface Engineering</b> Uni. Prof. Robert Galler
09:50 - 10:30	<b>Geological Uncertainty, geotechnical investigations, and observational design within the context of risk management</b> Uni. Prof. Mark Diederichs
10:30 - 10:45	<b>Coffee Break</b>
10:45 - 11:25	<b>Main risks associated to deep tunnelling</b> Gerard Seingre
11:25 - 12:05	<b>Risks in planning, design, construction of large diameter tunnels</b> Dr. Sotirios Vardakos
12:05 - 12:15	<b>Q&amp;A</b>
12:15 - 13:30	<b>Lunch</b>

**Session 2: Tendering & Implementation during construction**

13:30 - 14:10	<b>Monitoring for avoiding hazard situation during construction</b> Klaus Rabensteiner
14:10 - 14:50	<b>Contractual Practices and Geotechnical Baseline Reports</b> Matthias Neuenschwander
14:50 - 15:05	<b>Coffee Break</b>
15:05 - 15:45	<b>Conventional tunnelling cost assessment and benchmarking</b> Uni. Prof. Chrysothemis Paraskevopoulou
15:45 - 16:25	<b>Examples of Risk management in mechanized tunnelling</b> Dr. Karin Böppler
16:25 - 16:35	<b>Q&amp;A</b>



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# Saturday, 13 May, 2023

🕒 09:00 - 14:00

**ITA Executive Council Meeting**

📍 Conference 1 Hall

**FIDIC TG10**

📍 Conference 2 Hall

**EUTF Board meeting**

📍 Conference 3 Hall

🕒 09:10 - 17:25

📍 Athens Chamber of Commerce and Industry

**ITACET Training Course**

*Risk management and sustainable underground solutions*

### Session 3: Sustainability issues

09:10 - 09:50

**Introduction to Sustainability Issues in Tunnelling – A look underground in delivering a sustainable future for our people and planet**

Prof. Arnold Dix & Antonia Cornaro

09:50 - 10:30

**Sustainability issues in tunnelling**

Dr. Giovanni Alvarado

10:30 - 10:45

**Coffee Break**

10:45 - 11:25

**Sustainability issues – Digital engineering approach in tunnelling construction**

Max Labecki

11:25 - 12:05

**Life Cycle assessment and sustainability**

Uni. Prof. Panagiotis (Panos) Spyridis

12:05 - 12:15

**Q&A**

12:15 - 13:30

**Lunch**

### Session 4: Implementation during design, construction, and operation

13:30 - 14:10

**Digitalization and numerical methods contributions towards sustainability**

Uni. Prof. Mike Mooney

14:10 - 14:50

**Holistic Management of emergencies handling on Road Tunnels: The experience from safety drills**


Uni. Prof. Konstantinos Kirytopoulos

14:50 - 15:05

**Coffee Break**

**Saturday, 13 May, 2023**

15:05 - 15:45	<b>Example in CO2 reduction in tunnel construction from a material technology point of view</b> Dr. Wolfgang Aldrian
15:45 - 16:25	<b>Examples of resilient tunnel evacuation</b> Uni. Prof. Andreas Benardos
16:25 - 16:35	<b>Q&amp;A</b>
16:35 - 17:25	<b>Round Table Discussion: Future of Tunnelling - underground experts from Greece</b> Uni. Prof. Sergios Lampropoulos, Ioannis Lefas, Nick Koronakis, Ilias Michalis
17:25 - 17:30	<b>Closing Remarks</b>

 14:00 - 17:30**Meeting WGs + Committees + EXCO** *Allegro Hall*

# Sunday, May 14, 2023

🕒 08:30 - 10:30

**ITA General Assembly**

📍 *Banqueting Hall*

🕒 10:30 - 11:00

**Coffee Break**

🕒 11:00 - 12:30

**ITA General Assembly**

📍 *Banqueting Hall*

🕒 12:30 - 13:30

**GA Lunch**

🕒 14:00 - 17:30

**Working Group Meetings**

**WG 14 Meeting**

📍 *MC3 Hall*

**WG 6 Meeting**

📍 *MC3.2 Hall*

**WG 21 Meeting**

📍 *MC3.3 Hall*

**WG 9 Meeting**

📍 *MC3.4 Hall*

**WG 19 Meeting**

📍 *G. Marinos Hall*

**WG 17 Meeting**

📍 *Lecture Hall*

**WG 3 Meeting**

📍 *Allegro Hall*

**WG 22 Meeting**

📍 *Piano Hall*

**WG 12 Meeting**

📍 *Erato Hall*

**WG 2 Meeting**

📍 *Thalia Hall*

**WG 11 Meeting**

📍 *Clio Hall*

**WG 20 Meeting**

📍 *Conference 1 Hall*

**WG 23 Meeting**

📍 *Conference 2 Hall*

**WG 15 Meeting**


📍 *Conference 3 Hall*

**WG 5 Meeting**

📍 *Conference 7 Hall*




## Monday, May 15, 2023


 14:00 - 15:20

### Working Group Meetings
















WG 3 + WG 14 Meeting	 MC3 Hall
WG 6 Meeting	 MC3.2 Hall
WG 21 Meeting	 MC3.3 Hall
WG 9 Meeting	 MC3.4 Hall
WG 19 Meeting	 G. Marinos Hall
WG 17 Meeting	 Lecture Hall
WG 22 Meeting	 Piano Hall
WG 12 Meeting	 Erato Hall
WG 2 Meeting	 Thalia Hall
WG 11 Meeting	 Clio Hall
WG 20 Meeting	 Conference 1 Hall
WG 23 Meeting	 Conference 2 Hall
WG 15 Meeting	 Conference 3 Hall
WG 5 Meeting	 Conference 7 Hall

 15:20 - 15:50

### Coffee Break

 15:50 - 17:30

### Working Group Meetings

WG 3 + WG 14 Meeting	 MC3 Hall
WG 6 Meeting	 MC3.2 Hall
WG 21 Meeting	 MC3.3 Hall
WG 9 Meeting	 MC3.4 Hall
WG 19 Meeting	 G. Marinos Hall
WG 17 Meeting	 Lecture Hall
EXCO + Prime Sponsors Meeting	 Allegro Hall
WG 22 Meeting	 Piano Hall
WG 12 Meeting	 Erato Hall
WG 2 Meeting	 Thalia Hall
WG 11 Meeting	 Clio Hall
WG 20 Meeting	 Conference 1 Hall
WG 23 Meeting	 Conference 2 Hall
WG 15 Meeting	 Conference 3 Hall
WG 5 Meeting	 Conference 7 Hall

## Tuesday, May 16, 2023

🕒 08:30 - 10:00

**ITA COSUF Steering Board Committee** 📍 *Conference 1 Hall*

**ITA COSUF Activity Groups**

**Activity Group 1** 📍 *Conference 2 Hall*

**Activity Group 2** 📍 *Conference 3 Hall*

**Activity Group 3** 📍 *MC3.2 Hall*

**Activity Group 4** 📍 *Conference 7 Hall*

🕒 10:00 - 10:30

**Coffee Break**

🕒 10:30 - 13:00

**ITA COSUF Steering Board Committee** 📍 *Conference 1 Hall*

**ITA COSUF Activity Groups**

**Activity Group 1** 📍 *Conference 2 Hall*

**Activity Group 2** 📍 *Conference 3 Hall*

**Activity Group 3** 📍 *MC3.2 Hall*

**Activity Group 4** 📍 *Conference 7 Hall*

🕒 13:00 - 14:00

**Lunch**

🕒 13:15 - 14:00

**TUST Journal Event** 📍 *Conference 1 Hall*

🕒 14:00 - 15:20

**YMs Session**

Workshop on Overcoming Challenges and Fostering a Resilient Industry 📍 *MC 3 Hall*

**ITACUS Steering Board Committee** 📍 *Erato Hall*

**Nordic Forum** 📍 *Lecture Hall*

**WG 22 Meeting** 📍 *Piano Hall*

**ITACET Meeting** 📍 *G. Marinos Hall*

**Clients Forum** 📍 *Conference 1 Hall*

# Tuesday, May 16, 2023

🕒 14:00 – 15:20

## ITAtch Activity Groups

Activity Group 1 📍 Conference 2 Hall

Activity Group 2 📍 Conference 3 Hall

Activity Group 3 📍 MC3.2 Hall

Activity Group 4 📍 Conference 7 Hall

🕒 15:20 – 15:50

## Coffee Break

🕒 15:50 – 16:45

## YMs Session

Workshop on Overcoming Challenges and Fostering a Resilient Industry 📍 MC 3 Hall

🕒 15:50 – 17:30

WG 22 Meeting 📍 Piano Hall

ITACET Meeting 📍 G. Marinos Hall

Clients Forum 📍 Conference 1 Hall

## ITAtch Activity Groups

Activity Group 1 📍 Conference 2 Hall

Activity Group 2 📍 Conference 3 Hall

Activity Group 3 📍 MC3.2 Hall

Activity Group 4 📍 Conference 7 Hall

🕒 16:45 – 18:00

YMs General Assembly 📍 MC 3 Hall

## Wednesday, May 17, 2023

🕒 08:30 - 12:30

**Sustainability Committee**

📍 *Piano Hall*

🕒 10:30 - 11:00

**Coffee Break**

🕒 13:00 - 14:00

**Lunch Break**

🕒 13:45 - 15:20

**ITA General Assembly**

📍 *Banqueting Hall*

🕒 15:20 - 15:50

**Coffee Break**

🕒 15:50 - 17:15

**ITA General Assembly**

📍 *Banqueting Hall*

Time	Lambrakis Hall	Mitropoulos Hall	Skalkotas Hall	MC2 Hall	Poster Area
09:00 - 11:00	<p><b>OPENING CEREMONY</b>                      Welcome by Chair of Organizing Committee WTC2023                      Welcome by State's Authorities Representatives                      Welcome by Athens Mayor                      Welcome by President of Greek Tunnelling Society                      Welcome by President of ITA-AITES                      Welcome by President of ITA-AITES Young Members Group                      ITACET Foundation Awards &amp; GTS Award                      Welcome by Chair of WTC2023 Scientific Committee</p> <hr/> <p><b>Round Table</b>                      Underground Space for Mobility: Frontier Technologies                      Moderator: Lord Robert Mair                      Tarcisio Celestino, Martin Knights, Kancheepuram N. Gunalan, Marco Rosso</p> <p><b>Entertainment</b></p>				
11:00 - 11:30	<b>Coffee Break</b>	<b>Coffee Break</b>	<b>Coffee Break</b>	<b>Coffee Break</b>	<b>Coffee Break</b>
11:30 - 13:00	<p><b>Chairs:</b> Arnold Dix, Yiannis Bakoyiannis  <b>13th Muir Wood Lecture: "The Convergence - Confinement Method"</b>                      Marc Panet</p> <p><b>Keynote Lecture: "Seismic design and risk assessment of tunnels &amp; underground structures"</b>                      Kyriazis Pitilakis</p> <p>Official opening of exhibition by ITA President/Organising Committee Chair</p>				
13:00 - 14:00	<b>Lunch Break</b>	<b>Lunch Break</b>	<b>Lunch Break</b>	<b>Lunch Break</b>	<b>Lunch Break</b>
14:00 - 15:20	<p><b>Technical Session 1.1.</b>  <b>Knowledge &amp; Passion to Expand Underground for Sustainability &amp; Resilience</b>                      Chairs: Anna Lewandowska, Panos Spyridis</p> <p><b>14:00 - 14:20</b>                      Managing tunnel infrastructure: a new guideline                      M. Knights</p> <hr/> <p><b>14:20 - 14:40</b>                      Sustainable and Resilient city: the case study of a hypogeum stadium in a desert area                      G. Lunardi, P. Lunardi, G. Cassani, M. Gatti, C. L. Zenti</p> <hr/> <p><b>14:40 - 15:00</b>                      What might be our vision of the ecological transition in tunnels and underground spaces for the years to come?                      L. D'Aloia Schwartzentruber</p> <hr/> <p><b>15:00 - 15:20</b>                      BIM-enabled Carbon Accounting and Integrated Design of Underground Infrastructures                      X. L. Chen, M. Q. Huang, Q. B. Zhang, R. Wang</p>	<p><b>Technical Session 6.1.</b>  <b>Tunnelling in challenging conditions, Case histories and lessons learned</b>                      Chairs: Jinxiu (Jenny) Yan, Wout Broere</p> <p><b>14:00 - 14:20</b>                      The second trunk line project - Construction of a deep railway station in the heart of Munich                      J. Classen, R. Listl</p> <hr/> <p><b>14:20 - 14:40</b>                      Discrete Fracture Network Combined with Discontinuum Based Design for Deep Shafts - Quantifiable Risk Assessment and Design Method                      I. S. Haryono, P. W. Booth, A. Purwodihardjo, B. Vorster</p> <hr/> <p><b>14:40 - 15:00</b>                      Tunneling through a graphite bearing fracture zone during the expansion of the Stockholm metro to Nacka                      H. Ittner, M. Roslin, L. Martinsson, C. Iskender, R. Swindell, P. Sunesson</p> <hr/> <p><b>15:00 - 15:20</b>                      Numerical Analysis of the Melbourne Metro Town Hall Station Cavern                      D. P. Sainsbury, B. Coombes, R. Storry, A. Amon</p>	<p><b>Technical Session 2.1.</b>  <b>Geological, Geotechnical Site Investigation and Ground Characterization</b>                      Chairs: Petr Salak, George Stoumpos</p> <p><b>14:00 - 14:20</b>                      Innovative assessment methodologies to introduce rock mass behaviour into tunnelling - The legacy of Professor Paul Marinos in the Athens Metro                      V. Marinos, M. Benissi, G. Rovolis, K. Korkaris, G. Stoumpos, N. Syrtariotis, K. Aggelidaki, I. Papadatos, M. Panteliadou, D. Papouli</p> <hr/> <p><b>14:20 - 14:40</b>                      Characteristic of ground deformation with unsupported tunnel excavation in a sedimentary soft rock                      H. Takase, K. Namikawa, M. Matsumoto, J. Koseki</p> <hr/> <p><b>14:40 - 15:00</b>                      Contribution of twenty years of exploratory work in the complex carboniferous formation of the Montcenis Base Tunnel                      J. Senemaud, B. Serrano, C. Salot, M. E. Parisi, L. Brino</p> <hr/> <p><b>15:00 - 15:20</b>                      3D Geo-modelling using geophysical tools to aid injection grouting                      P. Lane-Nott, J. Whittaker, T. M. A. Delpont, R. S. A. Al-Harthy</p>	<p><b>Technical Session 3.1.</b>  <b>Planning and Designing of Tunnels and Underground Structures</b>                      Chairs: Tarcisio Celestino, Nikolaos Kazilis</p> <p><b>14:00 - 14:20</b>                      Reducing uncertainty in tunnel design                      A. Syed, C. Paraskevopoulou, V. Marinos</p> <hr/> <p><b>14:20 - 14:40</b>                      A design approach of large diameter surge shaft and passageway connection between headrace tunnels                      Ö. Kökten</p> <hr/> <p><b>14:40 - 15:00</b>                      3D numerical modelling of a large shallow cavern in densely built-up area for Sydney Metro                      S. Azari, D. Tsang, A. R. A. Gomes, R. Nair</p> <hr/> <p><b>15:00 - 15:20</b>                      A numerical investigation of the lining performance of composite SCL tunnels with debonded sprayed waterproofing membrane                      J. Su</p>	<p><b>Poster Session 1</b>  <i>(detailed program on page 36)</i></p>
15:20 - 15:50	<b>Coffee Break</b>	<b>Coffee Break</b>	<b>Coffee Break</b>	<b>Coffee Break</b>	<b>Coffee Break</b>
15:50 - 17:30	<p><b>Technical Session 1.2.</b>  <b>Knowledge &amp; Passion to Expand Underground for Sustainability and Resilience</b>                      Chairs: Martin Knights, Konstantinos Kirytopoulos</p> <p><b>15:00 - 16:10</b>                      Underground solution for urban resilience: Stormwater management infrastructure                      A. Kolji, T. Kazerani, G. Questi, J. Senn</p> <hr/> <p><b>16:10 - 16:30</b>                      Carbon footprint emissions of different tunneling construction methods                      P. Jarast, M. Bakhshi, V. Nasri</p> <hr/> <p><b>16:30 - 16:50</b>                      Preliminary design and socio-economic benefits of a road tunnel construction in the Tzoumerka mountainous area                      D. Kaliampakos, A. Benardos, P. Nomikos, V. Marinos, I. Zevgolis, E. Vlahogianni, G. Panagiotopoulos, A. Bougas</p> <hr/> <p><b>16:50 - 17:10</b>                      Search for potential Compressed Air Energy Storage sites in Switzerland                      E. Pimentel, G. Anagnostou, A. Brauchart</p> <hr/> <p><b>17:10 - 17:30</b>                      Urban underground space use in a climate neutral city                      N. G. Bobylev, D. Guo, A. Benardos</p>	<p><b>Technical Session 6.2.</b>  <b>Tunnelling in challenging conditions, Case histories and lessons learned</b>                      Chairs: Bill Newns, Kurosch Thuro</p> <p><b>15:00 - 16:10</b>                      TBM Cutter head management sub-sea in the Arabian Gulf                      G. Peach, H. Vigil</p> <hr/> <p><b>16:10 - 16:30</b>                      Jet grouting treatment for excavating a large tunnel in saturated soil in Norway                      F. Gallego, W. Summerer</p> <hr/> <p><b>16:30 - 16:50</b>                      Groundwater Control Measures Implemented in Singapore's Deep Tunnel Sewerage System Phase 2 (DTSS2) Project                      A. K. K. Soe, W. L. Lynn, B. Chionh, K. Khin</p> <hr/> <p><b>16:50 - 17:10</b>                      Construction of the largest road tunnel in Brazil - Tamoios Highway, Caraguatuba, Sao Paulo                      B. A. Cajueiro</p> <hr/> <p><b>17:10 - 17:30</b>                      Structural Design of Piraeus Port Metro Station                      D. Alifragkis, E. Gavrielatou, A. Gkavogiannis</p>	<p><b>Technical Session 2.2.</b>  <b>Geological, Geotechnical Site Investigation and Ground Characterization</b>                      Chairs: Klaus Rieker, Thomas Marcher</p> <p><b>15:00 - 16:10</b>                      Reliability analysis of discrete fracture network projections from borehole to shaft scale discontinuity data                      C. Brueckman, E. Eberhardt, S. Rogers</p> <hr/> <p><b>16:10 - 16:30</b>                      Observations on the condition of a hydraulic pressure tunnel through an ROV survey                      S. Lopez, F. Micheli, M. Buestan</p> <hr/> <p><b>16:30 - 16:50</b>                      The management of excavation data in accordance with the WBS for the Mont Cenis Tunnel                      M. E. Parisi, A. Rajevich, M. Cussino</p> <hr/> <p><b>16:50 - 17:10</b>                      Mapping by pictures: a case study of simplified rock mass classification to improve consistency                      P. Evins</p> <hr/> <p><b>17:10 - 17:30</b>                      Televiewer defect aperture logging for detailed model development - A case study from the M8, Sydney, Australia                      H. Baxter-Crawford, A. Lippert</p>	<p><b>Technical Session 3.2.</b>  <b>Planning and Designing of Tunnels and Underground Structures</b>                      Chairs: Søren Degn Eskesen, Zach Agioutantis</p> <p><b>15:00 - 16:10</b>                      Design Summary and Construction Considerations for the Nagdhunga Tunnel, Nepal                      T. Tomita, J. Mitsuo, Y. Nozue, R. Asai, N. M. Shakya</p> <hr/> <p><b>16:10 - 16:30</b>                      Consolidation and waterproofing by injection of PU resins. Ilarion Dam - treatment on the spillway tunnel                      D. Velez, D. Alumbros, D. Carpintero, P. Tsakas, E. Tsaka, K. Sakellariadis, Z. R. Papachatzaki</p> <hr/> <p><b>16:30 - 16:50</b>                      Copenhagen M4 line - safeguarding for future OSD                      B. North, M. Abrahamsen, F. Munck, E. Paulatto, M. Kjær Jensen</p> <hr/> <p><b>16:50 - 17:10</b>                      Design methodology for tunnel collars assessment under fire load                      M. De Poli, B. Lafarga</p> <hr/> <p><b>17:10 - 17:30</b>                      Design of porous tunnel for ecosystem protection in High Speed Two railway in UK                      S. Massinas, M. O'Sullivan, M. Miller, S. Poulvin, B. Kayadan, S. Neno, S. Parr, H. Taivo</p>	<p><b>Poster Session 2</b>  <i>(detailed program on page 38)</i></p>



Time	Trianti Hall	Mitropoulos Hall	Skalkotas Hall	MC2 Hall	MC 3 Hall	Poster Area	
08:30 - 10:30	<p><b>Technical Session 7.1.</b></p> <p><b>Innovation, Robotics and Automation</b> Chairs: Florent Robert, Jamal Rostami</p> <p><b>8:30 - 8:50</b> LiDAR Navigation in Underground Openings Z. Agioutantis, V. Androulakis, S. Schafrik, J. Sottile</p> <p><b>8:50 - 9:10</b> Storytelling as Collaboration Support for 3D Tunnel Monitoring C. Traxler, K. Chmelina</p> <p><b>9:10 - 9:30</b> Automated Tunnel Design with Dynamo and SAP2000 B. A. Boye, M. J. Wilcock</p> <p><b>9:30 - 9:50</b> Automation in Segmental Lining Production, use of robots, hydraulically systems and artificial intelligence S. Medel</p> <p><b>9:50 - 10:10</b> 3D Printing of tunnels D. P. Phillips, T. M. A. Delpoit</p> <p><b>10:10 - 10:30</b> Detection system of inner lining cracks for the Athens Metro P. Yiouta-Mitra, L. Lecornu, Z. Mouroutis</p>	<p><b>Technical Session 6.5.</b></p> <p><b>Tunnelling in challenging conditions, Case histories and lessons learned</b> Chairs: Daniele Peila, George Prountzopoulos</p> <p><b>8:30 - 8:50</b> Control of water leakages during TBM excavation – An example from the Follo Line tunnel project A. K. Kalager</p> <p><b>8:50 - 9:10</b> Geotechnical Challenges of Conventional Tunnelling underneath Sensitive Structures H. Jayarama, S. K. Gupta, C. Jadhav</p> <p><b>9:10 - 9:30</b> The use of Fiber Optics for Ground and Tunnel Support Monitoring – Two Decades of Lessons Learned N. Vlachopoulos</p> <p><b>9:30 - 9:50</b> Class A predictions of damage level in an historical fortress induced by twin tunnelling D. Boldini, C. Spaggiari, J. K. Abul, S. Fuoco, E. Lusini</p> <p><b>9:50 - 10:10</b> Ground freezing for cross-passages in Milan Metro Line 4 G. Lunardi, G. Cassani, M. Gatti, A. Pettinaroli, P. Caffaro, G. Pirro, A. Celot</p> <p><b>10:10 - 10:30</b> TBM performance in a complex geology when driving a water conveyance tunnel in Istanbul M. Cinar, F. Kara, N. Bilgin</p>	<p><b>Technical Session 3.5.</b></p> <p><b>Planning and Designing of Tunnels and Underground Structures</b> Chairs: Magali Schivre, Dimitrios Litsas</p> <p><b>8:30 - 8:50</b> Using a vermiculite-based fire protection mortar to increase the fire resistance of reinforced concrete tunnels A. Kounadis, N. Anagnostopoulos, P. Douvis, P. Nomikos, A. Benardos, A. N. Tsakiris, E. Katsivelis</p> <p><b>8:50 - 9:10</b> Preliminary comparison of the life cycle cost and safety of a single bore bidirectional tunnel including semitransverse ventilation, with a twin bore unidirectional tunnel of the same length longitudinally ventilated G. Angistalis, A. Astrantzis, A. Papamargariti</p> <p><b>9:10 - 9:30</b> Planning of the Tel Aviv Metro Network T. Grammenos, M. Sims, L. Samama, G. Nacht</p> <p><b>9:30 - 9:50</b> Optimizing the climate impact of tunnel structures by advanced numerical simulations P. Spyridis, K. Bergmeister</p> <p><b>9:50 - 10:10</b> Pillar stress estimation: 3D &amp; 2D numerical analysis vs. Tributary Area Theory I. Vlachogiannis, A. Benardos</p> <p><b>10:10 - 10:30</b> Numerical simulation of the rock cutting process using the Discrete Element Method A. Kalogeropoulos, T. Michalakopoulos</p>	<p><b>Technical Session 5.1.</b></p> <p><b>Conventional tunnelling, Drill-and-blast applications</b> Chairs: Pekka Nieminen, Tatiana Rotonda</p> <p><b>8:30 - 8:50</b> Design and Planning of Excavation Sequence and Blasting Techniques for large UG caverns R. Khalil, N. Bahuguna</p> <p><b>8:50 - 9:10</b> Development of Projection Mapping Technique for the Tunnel Face T. Tani, Y. Koga, S. Miyamoto</p> <p><b>9:10 - 9:30</b> French Hill Road Tunnels: A Pragmatic Rock Support Approach P. Salak, O. Nathan, O. Koc, A. Pamsl</p> <p><b>9:30 - 9:50</b> Design and Construction of the Deepest Underground Station in Canada V. Nasri, T. Vovou</p> <p><b>9:50 - 10:10</b> High temperature ground improvement J. Malone, C. Paraskevopoulou, B. Jones, G. Doukkas</p> <p><b>10:10 - 10:30</b> 3D numerical investigation of the axial forces acting on tunnel junctions constructed in fractured/weathered to very blocky rockmass F. Chortis, M. Kavvadas</p>	<p><b>ITACUS SPECIAL SESSION</b></p> <p><b>The Way Forward</b> <b>08:30-08:45</b> Welcome and Session Opening</p> <p><b>08:45-09:15</b> Advocacy and capacity building Abidemi Agwor, Vince Rono, Her Excellency Opunimi Akinkugbe</p> <p><b>09:15-09:45</b> Future think Veronika Petschen, Michael Kompatscher</p> <p><b>09:45-10:15</b> Collaboration and knowledge building Petr Salak, Marcelt Hart, Konstantinos Karantzoulis</p> <p><b>10:15-10:30</b> Session Wrap-up Antonia Cornaro, Han Admiraal</p>		
09:30 - 10:30						Poster Session 5 <i>(detailed program on page 46)</i>	
10:30 - 11:00	Coffee Break	Coffee Break	Coffee Break	Coffee Break	Coffee Break	Coffee Break	
11:00 - 13:00	<p><b>Technical Session 8.1.</b></p> <p><b>BIM, Big Data and Machine Learning Applications in Tunnelling</b> Chairs: Hangseok Choi, Ulrich Maidl</p> <p><b>11:00 - 11:20</b> The digitalization of the Tunnel Schöneich - Using a Digital Twin to improve operation and maintenance workflows of an existing road tunnel R. Sanfilippo, P. Canini, E. Carrera, M. Neidhart, R. Eberle, M. Wieland</p> <p><b>11:20 - 11:40</b> Settlements in NATM tunnels with deep neural networks M. Parra, E. Ochoa-Cornejo, F. Hernandez, G. Corral</p> <p><b>11:40 - 12:00</b> Computer Vision and Machine Learning for Cost-effective Fully Automated Visual Inspection of Tunnels: A Case Study E. Panella, J. Lucy, E. Fisk, S. T. Huang, Y. Loo</p> <p><b>12:00 - 12:20</b> Deep learning for masonry lined tunnel condition assessment J. Smith, C. Paraskevopoulou, A. Bedi, M. Invernici</p> <p><b>12:20 - 12:40</b> BBT, Lot Mules 2-3. Application of Machine Learning on TBM parameters for Risk Prediction tools F. Amadini, A. Flor, M. Secondulfo, D. Baliani, F. Cernera, M. La Morgia, A. Mei, F. Sassi</p> <p><b>12:40 - 13:00</b> BIM modelling of underground structures in the design and operation phases. What can we expect? S. Charlemagne, F. Robert, M. Macary, J. Doreau-Malioche, C. Banos</p>	<p><b>Technical Session 6.6.</b></p> <p><b>Tunnelling in challenging conditions, Case histories and lessons learned</b> Chairs: Eric Leca, Alex Schneider</p> <p><b>11:00 - 11:20</b> Taxaquara Fault – A complete solution for a complex problem I. J. F. Teixeira, C. V. Chanquini, G. Aguiar, M. Vassalo, C. A. Campanhã, P. França, M. Gurgueira, D. D. Carlo, E. Fecho</p> <p><b>11:20 - 11:40</b> Low cover tunnelling under North America's busiest highway A. Gakis, C. Karner, T. Schwind</p> <p><b>11:40 - 12:00</b> Water Inrush and Countermeasures at a Tunnel in South-Link Highway, Taiwan T. T. Wang, C. J. Kuo, C. L. Tseng, K. F. Lo, F. Y. Hsiao</p> <p><b>12:00 - 12:20</b> Construction of Kalbadevi Underground Metro Station of Mumbai Metro Line 3 by dealing with numerous social and technical challenges in the congested old city - Financial Capital of India A. Rawat, S. K. Gupta, S. Dalvi, R. R. Kumar</p> <p><b>12:20 - 12:40</b> Design and construction challenges of deep shafts in chalk R. Sivakumar, A. Maheetharan, M. Bevan, I. Thomas</p> <p><b>12:40 - 13:00</b> Lessons Learned During Excavation of the Incredibly Challenging Yin Han Ji Wei Water Diversion Tunnel L. Home, H. He</p>	<p><b>Technical Session 3.6.</b></p> <p><b>Planning and Designing of Tunnels and Underground Structures</b> Chairs: Elena Chirioti, Ioannis Vazaios</p> <p><b>11:00 - 11:20</b> Thermal performance of a metro station in Turin equipped with energy geostructures A. Insana, M. Barla, S. Aiassa, F. Antolini</p> <p><b>11:20 - 11:40</b> Use of the Tunnel Face Stability Factor in unsupported and supported tunnel faces D. Georgiou, M. Kavvadas</p> <p><b>11:40 - 12:00</b> The Glacier Garden in Lucerne gets a new main underground attraction S. Cattori, S. Zingg</p> <p><b>12:00 - 12:20</b> Porto Metro Rubi Line – The Design of the Conventional Tunnels in Residual Soils C. Cabral Dias, P. Lamas Alvarez, S. Gomez, V. Silva, J. Dores</p> <p><b>12:20 - 12:40</b> The excavation of the Brenner Base Tunnel where the Eurasian and Adriatic tectonic plates collide D. Marini, G. Venditti</p> <p><b>12:40 - 13:00</b> The new major railway lines in Southern Italy: planning and design approaches towards sustainable solutions A. Pigorini, A. Sciotti, A. Corbo, G. Quarzicci, A. Romualdi</p>	<p><b>Technical Session 4.2.</b></p> <p><b>Mechanised Tunnelling (and microtunnelling)</b> Chairs: Laurence Delplace, Markus Thewes</p> <p><b>11:00 - 11:20</b> Simulation of EPB tunneling using discrete event model: case study of various grounds in Korea J. W. Lee, H. B. Kang, Y. J. Shin, J. H. Jung</p> <p><b>11:20 - 11:40</b> TBM excavation underneath a road viaduct and railway lines for Warsaw M2 metro line: 3D modelling and monitoring results M. Minno, L. Ciochetti, F. Capata, V. Capata</p> <p><b>11:40 - 12:00</b> Expanding the application range of EPB shields using SolidFoam M. Schröer, N. Gramlich, M. Thewes, L. Langmaack</p> <p><b>12:00 - 12:20</b> New service tunnel Kerenzerberg: innovative approach in order to increase the degree of mechanization F. Carrera-Henke, P. Beeler, G. Gubler</p> <p><b>12:20 - 12:40</b> On the way to a better performance prediction for small-diameter hard rock TBMs G. Lehmann, H. Käsling, K. Thuro</p> <p><b>12:40 - 13:00</b> Estimation of Face Pressure Based on Empirical and Numerical Methods in Mechanized Tunneling A. S. Peker, B. Zengin</p>	<p><b>WOMEN IN TUNNELLING</b></p> <p><b>Picture an underground expert: paving the road to diversity</b> Moderators: Paraskevi Yiouta-Mitra, Chrysothemis Paraskevopoulou</p> <p>Eleytheria Vagli</p> <p>Theodora Vovou</p> <p>Helen Reeves</p> <p>Mark Diederichs</p> <p>Artemis Plemmenou</p> <p>Arnold Dix</p> <p>Sanja Zlatanovic</p> <p>Jinxu (Jenny) Yan</p>	Poster Session 6 <i>(detailed program on page 47)</i>	

Time	Trianti Hall	Mitropoulos Hall	Skalkotas Hall	MC2 Hall	MC 3 Hall	Poster Area	
13:00 - 14:00	Lunch Break	Lunch Break	Lunch Break	Lunch Break	Lunch Break	Lunch Break	
14:00 - 15:20	<b>Technical Session 8.2.</b> <b>BIM, Big Data and Machine Learning Applications in Tunnelling</b> Chairs: Dimitios Rizos, Jurij Karlovsek <b>14:00 - 14:20</b> Tunnel Euralpin Lyon-Turin CO08 – BIM implementation in conventional tunneling F. Rich, C. Giai Via, B. Bitetti, G. Ragazzo, J. Pepiot, S. Lione <b>14:20 - 14:40</b> Tunnel 4.0: Managed Digital Twin for Tunnel Operations N. S. Diren, S. Althen <b>14:40 - 15:00</b> Development of Penetration Rate Prediction Models for Hard Rock TBM in Construction Phase by Deep Learning and Block Model Techniques: A Case Study in Mae Tang-Mae Ngad Tunnel, Northern Thailand N. Monthanopparat, T. Tanchaisawat, C. Tanomtin <b>15:00 - 15:20</b> Multi-Camera-Based Tunnel Segment Detection and Inspection Using Artificial Intelligence A. Boerzel, F. Werres, L. Steinmann, J. Fehrenbach, D. Fehrenbach	<b>Technical Session 9.3.</b> <b>Safety, Risk and Operation of Underground Infrastructure</b> Chair: Konstantinos Sakkas, Carmine Todaro <b>14:00 - 14:20</b> Monitoring of compressed air workers during hyperbaric interventions in TBM N. Subbotina, J. Castro, L. Pellegrini, J. Frydman, L. Correa <b>14:20 - 14:40</b> ASET Estimation through fire dynamics Simulation for various cases of fire incidents in rail tunnels D. Papakonstantinou, A. Kallianiotis, A. Benardos <b>14:40 - 15:00</b> Seismic performance of a major twin tunnel with unreinforced concrete lining: Expert witness study for the needs of arbitration I. Anastasopoulos, G. Gazetas <b>15:00 - 15:20</b> Modelling underground mine ventilation characteristics using artificial neural networks M. Karagianni, A. Benardos	<b>Technical Session 7.2.</b> <b>Innovation, Robotics and Automation</b> Chairs: Ross Dimmock, Nikolaos Vlachopoulos <b>14:00 - 14:20</b> New development of sprayed concrete with improved waterproofing, durability and sustainability performance K. G. Holter, T. A. M. Hammer, N. H. Trussell <b>14:20 - 14:40</b> Continuous advance – developments for a new Herrenknecht TBM J. Tröndle, G. Wehrmeyer, F. Steiner <b>14:40 - 15:00</b> Integration of Robotics in underground mining construction works C. Crespo, F. Rodriguez <b>15:00 - 15:20</b> Some hydro-mechanical properties of treated sand with colloidal silica G. Spagnoli, G. Tintelnot	<b>Technical Session 4.3.</b> <b>Mechanised Tunnelling (and microtunnelling)</b> Chairs: Stefan Maurhofer, Giovanni Alvarado <b>14:00 - 14:20</b> Determination of the flow behaviour of excavated soils – Correlation between consistency and the penetration resistance M. Schröer, M. Thewes <b>14:20 - 14:40</b> Influence of chip-size on development of adhesion for conditioned clayey soils A. Carigi, A. Di Giovanni, S. Saltarin, D. Peila, C. Todaro <b>14:40 - 15:00</b> Challenges experienced during simultaneous backfill grouting using Single Shield Large Diameter TBM driven in a sharp negative slope V. B. M. Braga, J. C. S. Zapico, V. Tyagi, R. Bono <b>15:00 - 15:20</b> Overview of soft ground TBM performance K. Gunnar-Holter, P. D. Jakobsen, K. D. Young, A. Bruland, O. Roset, D. van Oosterhout			Poster Session 7 (detailed program on page 50)
15:20 - 15:50	Coffee Break	Coffee Break	Coffee Break	Coffee Break	Coffee Break	Coffee Break	
15:50 - 17:30	<b>Technical Session 8.3.</b> <b>BIM, Big Data and Machine Learning Applications in Tunnelling</b> Chairs: Jurij Karlovsek, Cemal Balci <b>15:50 - 16:10</b> Analysing and predicting surface settlements from metro construction using Machine Learning methods K. N. Sioutas, A. Vlachogiorgos, A. Benardos <b>16:10 - 16:30</b> Generating a digital twin for tunneling projects during the construction phase F. Hegemann, J. Stascheit, U. Maidl, R. Gangrade, P. Kottke <b>16:30 - 16:50</b> Are we ready for TBM tunneling automation? Two strategies to improve model performance S. Mostafa, R. L. Sousa, B. Klink, H. Einstein <b>16:50 - 17:10</b> Tunnel Digitalization Center – Beyond BIM in underground construction V. Petschen, R. Brandt, O. Celebi, R. Wyss, N. Elkuch <b>17:10 - 17:30</b> Methods for local big data integration to reduce geotechnical uncertainty and risk on subsurface infrastructure projects M. A. Mooney, J. G. Grasmick, R. Gangrade	<b>Technical Session 9.4.</b> <b>Safety, Risk and Operation of Underground Infrastructure</b> Chair: Spyridon Konstantis <b>15:50 - 16:10</b> Monitoring daily and seasonal movement of an immersed tunnel W. Broere, X. Zhang <b>16:10 - 16:30</b> Tunnel inspections with the aid of high-performance image acquisition tools: an insight on key parameters for a successful detection of structural defects J. Doreau-Malioche, F. Paillette, M. Puglia, P. Spohn, S. Frachon, B. Poli <b>16:30 - 16:50</b> Earth, Fire, Water, Wind: Addressing insurance expectations by pro-actively taming the four elements T. Konstantis <b>16:50 - 17:10</b> Verification of effectiveness of tunnel face monitoring supportive system using VR on evacuation behavior of workers R. Hase, Y. Mihara, D. Awaji, R. Hojo, S. Shimizu <b>17:10 - 17:30</b> Capturing Soil Transition Location Uncertainty in TBM Tunnelling R. Gangrade, J. Grasmick, M. A. Mooney	<b>Technical Session 3.7.</b> <b>Planning and Designing of Tunnels and Underground Structures</b> Chairs: Alexandre Gomes, Marliena Cardu <b>15:50 - 16:10</b> The application of DFN modelling to assess the applicability for shaft construction I. Vazaios, C. Hu, J. Bottomley, P. Stakne, G. Williams, D. Warburton <b>16:10 - 16:30</b> Tomography based method for investigation of steel fibre distribution in tunnel shotcrete A. Ansell <b>16:30 - 16:50</b> Tunnel excavations supported by frozen soil bodies: Lab testing and modelling U. Schindler, S. Chrisopoulos, W. Yan, R. Cudmani <b>16:50 - 17:10</b> Final Tunnel Design within 24 hours R. R. E. Vervoorn, A. Santos, A. Khalaf, O. Noureldin <b>17:10 - 17:30</b> Significance of Initial Lining on Dynamic Performance of Final Lining for Large Size Cavern S. H. (J.) Choi, W. H. Hansmire, C. Herranz	<b>Technical Session 4.4.</b> <b>Mechanised Tunnelling (and microtunnelling)</b> Chairs: Lars Babendererde, Georgios Angistalis <b>15:50 - 16:10</b> Correlation Study between Indentation Indices and Physical-Mechanical Properties of Rocks A. Shaterpour-Mamaghani, H. Copur, C. Balci, D. Tumas, T. Erdogan, E. Dogan, O. Sirin <b>16:10 - 16:30</b> From calamity to full compliance - the Rijnlandroute bored tunnel H. Mortier, M. Brugman, Y. Liem, B. van de Water, J. Vervoort, O. Gastebled, S. Giuliani <b>16:30 - 16:50</b> The Central Interceptor Project: A complex sewage tunnel network in the city of Auckland G. Giacomini, M. Maffucci, F. Saibene, S. Vittor, D. Goudelis <b>16:50 - 17:10</b> Monastiraki Station Main Tunnel temporary lining design, using microtunnels E. Zygouri, D. Bairaktaris <b>17:10 - 17:30</b> The washing-out resistance of the two-component grout: a laboratory test campaign C. Todaro, A. Carigi, D. Martinelli, D. Peila			



# ITA PLENARY SESSION • TUESDAY, MAY 16, 2023

Time	Trianti Hall
08:30 - 10:00	<p align="center"><b>ITA Plenary Session, Part I</b>  <b>Presentation of WGs and Committees report</b></p> <p align="center"><b>OPENING</b>  Arnold Dix, <i>ITA President</i></p> <hr/> <p align="center"><b>Rock Support for mechanically bored tunnels</b>  Sindre Log, <i>ITAtech</i></p> <hr/> <p align="center"><b>Guideline for radially installed bolts in Tunnelling</b>  Günther Volkmann, <i>ITAtec</i></p> <hr/> <p align="center"><b>Logistics aspects of long and deep tunnels</b>  Magali Schivre, <i>WG17</i></p> <hr/> <p align="center"><b>An owner's guide to submerged floating tunnels</b>  Marcel't Hart, <i>WG11</i></p> <p align="center"><b>Walter Grantz memorial</b></p> <hr/> <p align="center"><b>Code of practice for risk management of tunnels works - 3RD edition</b>  Patrick Bravery, <i>ITA- IMIA</i></p> <hr/> <p align="center"><b>Presentation of the work of the task force on possible restructuring of the Working Groups</b>  Jamal Rostami, <i>ITA Vice President</i></p>
10:00-10:15	<p align="center"><b>SPECIAL PRESENTATION</b>  <b>CERN Existing and Future Tunnels</b>  John Osborne</p>
10:15-10:45	<p align="center"><b>Coffee Break</b></p>
10:45 - 13:00	<p align="center"><b>ITA Plenary Session, Part II</b>  <b>Underground infrastructures to strengthen resilience and reduce vulnerability to climate change</b></p> <p align="center"><b>OPENING</b>  Arnold Dix</p> <hr/> <p align="center"><b>Introduction</b>  <b>Presentation of the WG 20 report: Urban Underground Space for resilient cities</b>  Wout Broere (WG20)</p> <hr/> <p align="center"><b>Round Table 1</b>  <b>Building Resilient infrastructures – New materials, examples from China, US and Italy</b>  Benoit de Rivaz, Hongwei Huang, Nasri Munfah, Daniele Peila</p> <hr/> <p align="center"><b>Round Table 2</b>  <b>Tunnels part of city resilience – examples from India, Portugal, Canada, New Zealand, Norway</b>  A.K. Dinkar, Goncalo Diniz, Giuseppe Gaspari, Matt Mules</p> <hr/> <p align="center"><b>Round Table 3</b>  <b>Planning the future – How underground space is used in selfsustaining communities, Mission Earth first, use of subsurface in Cities Climate plans, resilience towards natural disasters (earthquake)</b>  Antonia Cornaro, Nikolai Bobylev, Suresh Sharma</p> <hr/> <p align="center"><b>Conclusion</b>  <b>ITA Committee on Sustainability</b>  Tommy Olsen, Arnold Dix</p>

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# E-POSTERS

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## POSTER SESSION 1

Monday, May 15, 2023 🕒 14:00 – 15:00 📍 Poster Area

**Poster Station A****14:00 - 14:20**

**PP\_Theme01\_01:** Low-carbon ground support design for an underground tunnel crossover with a narrow roof pillar in a road tunnel project in Sydney, Australia

S. Thirukumaran, D. Oliveira, M. Sheffield

**14:20 - 14:40**

**PP\_Theme01\_02:** Shafts and spiral tunnels for heat storage – an economic study on ideal geometries

S. Messerklinger, M. Smaadahl, E. Saurer

**14:40 - 15:00**

**PP\_Theme01\_03:** Low Carbon Lining for Tunnelling Precast Segment – How Dramix® Fibre Reinforced Concrete Could Facilitate this Achievement

B. De Rivaz

**Poster Station B****14:00 - 14:20**

**PP\_Theme01\_04:** The New Line 16 Sao Paulo Metro and Best use of zero-carbon technology

H. C. Rocha, F. M. Pontes, D. L. C. Lima

**14:20 - 14:40**

**PP\_Theme01\_05:** Final Design Considerations for the Major Rehabilitation of the Montreal Lafontaine Tunnel

J. Habimana, B. Amara, R. Showbary, L. Rus

**14:40 - 15:00**

**PP\_Theme01\_06:** Advancement of Conventional Cost Benefit for Selection of Truly Sustainable Infrastructure Alternatives

T. Kondrachova, G. Grasselli, E. Miller

**Poster Station C****14:00 - 14:20**

**PP\_Theme01\_07:** A look at embodied carbon in segmental tunnel lining

J. P. Banyai, A. Caspersen

**14:20 - 14:40**

**PP\_Theme01\_08:** Traceability and environmental follow-up of excavated materials – learnings from implementation experiences with bigger projects

C. Villette, T. Dumas

**14:40 - 15:00**

**PP\_Theme01\_09:** Environmental profile of bentonite drilling fluids for civil engineering applications

S. Padulosi, D. F. Putzu, N. Bartolini, D. Sebastiani, M. Cinelli, S. Mangifesta, I. Bavasso

**Poster Station D****14:00 - 14:20**

**PP\_Theme02\_01:** Acceleration of soft ground with tunnels near soft-hard strata interface: longitudinal shaking

Y. Yong, L. Siming, X. Mingqing

**14:20 - 14:40**

**PP\_Theme02\_02:** Geotechnical analysis of adapted permeation and compaction grouting techniques for detailed design and construction of underground structures

T. M. A. Delport, J. A. S McCosh, K. M. Nowak

**14:40 - 15:00**

**PP\_Theme02\_03:** Geostatistical modelling of geotechnical properties in the context of a tunneling project: application to the Grand Paris Express project (France)

L. Lacherade, A. Marache, A. Denis, I. Halfon, L. Closset, J. Rohmer, F. Quesnel

**Poster Station E****14:00 - 14:20**

**PP\_Theme02\_04:** Acoustic emission of calcitic and dolomitic rock specimens during uniaxial compression tests

M. A. Lotidis, P. P. Nomikos

**14:20 - 14:40**

**PP\_Theme02\_05:** Innovative and conventional geophysical investigations at the Hamza Bey (Alcazar) monument in Thessaloniki, Greece

G. N. Tsokas, P. I. Tsourlos, G. Vargemezis, A. Stampolidis, E. Athanasiou, C. Raptis

## POSTER SESSION 1

Monday, May 15, 2023 🕒 14:00 – 15:00 📍 Poster Area

14:40 - 15:00

**PP\_Theme02\_06:** Hydrogeology of the Brenner Base Tunnel in the Italian section: observed inflows and forward monitoring procedures

P. Perello, S. Skuk, A. Spaziani, A. Voza

### Poster Station F

14:00 - 14:20

**PP\_Theme03\_01:** Comparing the issues, risks and levels of geotechnical investigation for remote hydropower tunnels with urban transportation tunnels

A. G. Noble

14:20 - 14:40

**PP\_Theme03\_03:** Parametric analysis of shotcrete lining capacity using an improved Compressive Membrane Action model

E. S. Bernard, R. Winterberg

14:40 - 15:00

**PP\_Theme03\_02:** Pre-Cast Tunnel Linings for Hydropower Tunnels: Advantages and Successes

D. Brox, R. Grandori

### Poster Station G

14:00 - 14:20

**PP\_Theme04\_01:** The assessment of intact rock strength for penetration

H. Wannenmacher, P. Hamdi,

F. Amann, T. Marcher, T. Frühwirt

14:20 - 14:40

**PP\_Theme04\_02:** Innovation and application of triple-mode shield machine/TBM

C. P. Zhong, W. B. Zhu

14:40 - 15:00

**PP\_Theme04\_03:** Study on the cutter wear based on the cutterhead working status monitoring system in TBM tunnelling

Q. Gong, X. Xie, F. Wu, J. Liu, H.

Xing, H. Ren, H. Zhang, Y. Xiao

### Poster Station H

14:00 - 14:20

**PP\_Theme09\_02:** Risk Management in Outfall Tunnelling, the MPSO Tunnel, Doha, Qatar

J. B. Stypulkowski, A. M. Najder

Olliver, K. S. F. S. Al-Khayareen

14:20 - 14:40

**PP\_Theme09\_03:** Development near Underground Rail Corridors –Engineering Assessment with Case Studies

J. Pan, A. Kuras, N. Loganathan

14:40 - 15:00

**PP\_Theme09\_04:** Experimental study on macro synthetic fibre reinforced concretes subjected to tunnel fires

T. Clarke, S. Fragomeni,

M. Guerrieri

### Poster Station I

14:00 - 14:20

**PP\_Theme09\_05:** A 3D numerical study of sprayed concrete lined junctions

A. Keneti, A. Thomas, B. Sainsbury

14:20 - 14:40

**PP\_Theme09\_01:** Correlation of ROV Observations with Actual Damage in the Tala Headrace Tunnel

D. Brox, S. Wangdi, L. Namgyal

14:40 - 15:00

**PP\_Theme09\_06:** Influence of grouting on recovery of longitudinal differential settlement of shield tunnel lining

Y. S. Hua, H. W. Huang,

D. M. Zhang, P. D. Li

### Poster Station J

14:00 - 14:20

**PP\_Theme03\_04:** Study of a large opening in a retaining wall by a TBM: consequences on the ground and the structures, structural reinforcement solutions and impacts on neighboring constructions.

E. Charanton, L. Marchese,

N. Noroozpour

14:20 - 14:40

**PP\_Theme03\_05:** Tunnel Euralpin Lyon Turin C08- Design of temporary support profile of base tunnels and cross-passages

A. Ettaouil, G. Ragazzo, J. Piepot,

B. Bitetti, L. Peano, F. Rich

14:40 - 15:00

**PP\_Theme03\_06:** Advanced semi-probabilistic methods for the design and assessment of concrete tunnel linings

P. Spyridis, L. Novák, D. Novák,

K. Bergmeister

## POSTER SESSION 2

Monday, May 15, 2023  15:50 – 17:10  Poster Area**Poster Station A****15:50 - 16:10****PP\_Theme03\_07:** Tunnelling in the Desert, Wakrah and Wukair Tunnel, Doha, QatarJ. B. Stypulkowski, A. M. Najder Olliver, K. S. F. S. Al-Khayareen**16:10 - 16:30****PP\_Theme03\_08:** Numerical analysis of the effects of grouting on mitigating the risk of hydraulically induced failure during deep shaft excavationJ. Šaponjić, S. Radovanović, N. Divac, D. Divac**16:30 - 16:50****PP\_Theme03\_09:** Design and Construction of Underground Infrastructure at AirportsL. J. Pakianathan**16:50 - 17:10****PP\_Theme03\_10:** Curved diaphragm wall construction: A case study on the challenges facedK. P. Lim, K. Kaliaperumal, X. Zheng, Y. Zheng**Poster Station B****15:50 - 16:10****PP\_Theme03\_11:** Interaction between underground works and deep foundations. A risk assessment approachJ. V. Cruanyes Gavilà, M. Becerril Muñoz, P. Ramírez Rodríguez, P. Ingram**16:10 - 16:30****PP\_Theme03\_12:** The Traditional Method of Madrid – a 2D SSI approach calibrated via 3D modellingC. Cabral Dias, A. Gonzalez Villavicencio, J. Masagué Martín**16:30 - 16:50****PP\_Theme03\_13:** Effective use of fibres of various types and material for shotcrete in rock support for tunnelsA. Sjölander, A. Ansell, E. Nordström**16:50 - 17:10****PP\_Theme03\_14:** Rehabilitation of an existing water supply gallery network built in the early 1970sA. Nicolle, A. Wohnlich, B. Quigley, A. Arigoni**Poster Station C****15:50 - 16:10****PP\_Theme01\_10:** Resins filling injections of an extensive system of voids behind the final lining of Monte Baldo highway tunnelM. Mazzola, M. Giordano, C. Alessio, B. Spigarelli, C. Ghilardi**16:10 - 16:30****PP\_Theme01\_11:** Autostrade per l'Italia (ASPI) TRS Tunnel Renewal Strategy: the cases of Castello 1 left, San Fermo right and Colle Marino left tunnelsM. Mazzola, M. Giordano, C. Alessio, B. Spigarelli**16:30 - 16:50****PP\_Theme01\_12:** ADVANTEX: Research of innovative tools to support the logistics of use of excavation materials produced by the Lyon-Turin railway line for the best sustainability and circular economy of the processA. Fantilli A., M. Cardu, A. M. Lingua, P. Marini, J. M. Tulliani, M. Rocca, R. Scevaroli**16:50 - 17:10****PP\_Theme01\_13:** Practical countermeasures for road tunnels against collapse of lining caused by earthquakeA. Kusaka, N. Isago, K. Kawata**Poster Station D****15:50 - 16:10****PP\_Theme02\_07:** Optimization of electrical resistivity survey utilizing harmony search algorithm to predict anomalous zone ahead of tunnel faceY. Yoon, M. Kang, J. Lee, Y. Choe, H. Choi**16:10 - 16:30****PP\_Theme02\_08:** Rheological Properties of Artificial Sandy Soil Conditioned with Foam and PolymerB. Hwang, J. Kwak, D. Lee, A. Bae, H. Choi**16:30 - 16:50****PP\_Theme02\_09:** Laboratory experiments for hazardous ground prediction ahead of a TBM tunnel face based on resistivity and induced polarizationM. Kang, J. Lee, S. Park, K. Kwon, H. Choi

## POSTER SESSION 2

Monday, May 15, 2023 15:50 – 17:10 Poster Area

**16:50 - 17:10**

**PP\_Theme02\_10:** Which tests for a rapid geotechnical characterization of excavated materials for use as concrete aggregates? Application to the Lyon Turin base Tunnel  
A. Cherrey, D. Chamoley, J. Vennat, P. Schriqui, J. Blache

**Poster Station E****15:50 - 16:10**

**PP\_Theme04\_04:** Analysis of annular grouting in tunnels tail void with gap by an interface model  
A.H. Ahn, A. Pouya, G. C. Cho

**16:10 - 16:30**

**PP\_Theme04\_05:** New Technology of readily biodegradable soil conditioning foaming agents  
M. A. Sposetti

**16:30 - 16:50**

**PP\_Theme04\_06:** Dispersion of fine-grained soils in slurry shield tunnel excavation  
J. Fillibeck, U. Schindler, R. Cudmani

**16:50 - 17:10**

**PP\_Theme04\_07:** Computational modelling of artificial ground freezing in mechanized tunnelling  
R. J. Williams, A. Alsahly, G. Meschke

**17:10 - 17:30**

**PP\_Theme04\_08:** Semi-Analytical Approach to Estimate Slurry Penetration in Highly Permeable Soils  
A. Wiendl, J. Fillibeck, R. Cudmani

**Poster Station F****15:50 - 16:10**

**PP\_Theme07\_01:** Automating fault identification along the HS2 Chilterns tunnel alignment from aerial LiDAR scanning  
G. Sercombe, C. Paraskevopoulou, A. Bedi, I. Vazaios

**16:10 - 16:30**

**PP\_Theme07\_02:** Utilising remote sensing to digitally map discontinuities in tunnelling  
A. Allen, C. Paraskevopoulou, J. Smith, A. Bedi, M. Invernici

**16:30 - 16:50**

**PP\_Theme09\_07:** Statistical interpretation of tunnel project

characteristics and their influence on technical risks - current and future challenges  
C. Paraskevopoulou, P. Spyridis, D. Proske, G. Doulikas

**Poster Station G****15:50 - 16:10**

**PP\_Theme05\_01:** A framework to assess the expected utility of the observational method  
T. P. Roper, J. Karlovšek

**16:10 - 16:30**

**PP\_Theme05\_02:** Origin of the vibrations induced by tunnels' excavation  
M. Cardu, C. Todaro

**16:30 - 16:50**

**PP\_Theme05\_03:** Correlation between the Round Panel test and the Barcelona test for the control of shotcrete reinforced with fibers in tunnels  
S. Carmona, C. Molins, C. Parada

**16:50 - 17:10**

**PP\_Theme05\_04:** Face stability of tunnels under the groundwater level: comparison of existing theories and introduction of a new analytical method calibrated on 3D FEM calculations  
D. L'Amante, G. Fantauzzi

**Poster Station H****15:50 - 16:10**

**PP\_Theme09\_08:** Numerical analysis of rehabilitating an existed tunnel by grouting with different grouting volumes considering soil spatial variability  
Z. W. Ye, J. Z. Zhang, D. M. Zhang, H. Shao

**16:10 - 16:30**

**PP\_Theme09\_09:** Shaking table test of fault site effect on seismic response of fault-crossing tunnels  
R. H. Li, Y. Yuan, X. Zhao

**16:30 - 16:50**

**PP\_Theme09\_10:** Experimental study on ultimate bearing capacity of shield tunnel segments under unloading conditions  
K. P. Zhang, X. H. Zhang, Q. Zhang, Z. C. Pei, L. Z. Qi

## POSTER SESSION 2

Monday, May 15, 2023 15:50 - 17:10 Poster Area

16:50 - 17:10

**PP\_Theme09\_11:** Experimental study on ultimate bearing capacity of the stagger-jointed shield tunnel reinforced by steel plate

X. Zhang, Z. Pei, K. Zhang

### Poster Station I

15:50 - 16:10

**PP\_Theme09\_12:** A probabilistic approach to evaluate the seismic loss of metro tunnels in Shanghai City

Z. K. Huang, D. M. Zhang, W. D. Zhou, K. Pitilakis, G. Tsinidis, S. Argyroudis

16:10 - 16:30

**PP\_Theme09\_13:** Time-dependent reliability assessment of shield tunnel considering corrosion of segment reinforcement and joint bolts

D. M. Zhang, Z. K. Huang, W. D. Zhou, C. C. Chen, Y. Tong

16:30 - 16:50

**PP\_Theme09\_14:** Seismic Experiment of Tunnel-group Metro Station in Rock Site

R. Li, Y. Yuan

16:50 - 17:10

**PP\_Theme09\_15:** Role of variable speed drives in safe, reliable and sustainable tunnel ventilation

M. Fedorovicheva

### Poster Station J

15:50 - 16:10

**PP\_Theme10\_01:** Project Alliances: Do they work for tunneling projects?

M. Xanthouli, C. Kerber, N. Khokhar

16:10 - 16:30

**PP\_Theme10\_02:** Contractual Practices & Project Management: TELT Time Adjustment Mechanism

M. Bertrand, A. Fontana, C. Salot, C. Dumoulin, M. Macary

16:30 - 16:50

**PP\_Theme10\_03:** Development of a Project Objective and Requirement System (PORS) for major infrastructure projects to align the interests of all the stakeholders

S. C. Becker, P. Sander





## POSTER SESSION 3

Tuesday, May 16, 2023 14:00 – 15:00 Poster Area

**Poster Station A**

14:00 - 14:20

**PP\_Theme01\_14:** Waterproof sprayed concrete with improved sustainability performance

E. S. Moe, K. G. Holter, H. Strømsvik

14:20 - 14:40

**PP\_Theme01\_15:** Mixed use potential of existing road tunnels for conveying water for hydropower generation: A case study of motorway tunnels in Swat, Pakistan

A. Riaz, A. Hussain, M. Ajar, Z. Ud Din

14:40 - 15:00

**PP\_Theme01\_16:** Experimental study on cyclic shear behavior of biopolymer-treated soil as a tunnel backfill material

D. Y. Park, M. H. Lee, G. C. Cho, I. H. Chang

**Poster Station B**

14:00 - 14:20

**PP\_Theme06\_01:** Anti-soil ingress for immersion joints

H. Mortier, P. Menge, P.-J. Verdonck

14:20 - 14:40

**PP\_Theme06\_02:** Tunneling with low rock cover within tight geometric constraints

M. Abrahamsen, R. Alves, C. Cátedra

14:40 - 15:00

**PP\_Theme06\_03:** Extending Immersion Technology for the First Immersed Tunnel in the Alps

M. Ø. Sørensen, S. Sterkenburgh, J. Bubel

**Poster Station C**

14:00 - 14:20

**PP\_Theme06\_04:** Experiences and challenges during the implementation of the Blominmäki sewage tunnels, Espoo, Finland

I. Konstantas, C. af Hällström, J. Salmelainen, J. Paajanen, J. Yli-Kuivila

14:20 - 14:40

**PP\_Theme06\_05:** Grand Paris Express Line 16-1: difficulties of mining under a rail junction into a steel bell

L. Carlos, F. Grisel, G. Pini

14:40 - 15:00

**PP\_Theme06\_06:** Geotechnical assessment of ground surface settlements induced by microtunneling construction. Case study: Pikrodafneza stream.

P. Matsouliadis, C. Stratakos, A. Ntountoulakis

**Poster Station D**

14:00 - 14:20

**PP\_Theme06\_07:** Ground settlements induced by tunneling in soft and variable rock formations. Observed performance of SEM tunnelling for a section of Athens Metro - Line 3.

A. Alexandris

14:20 - 14:40

**PP\_Theme06\_08:** Numerical simulation of circular tunnel intersections in anisotropic rock mass

A. Zafeiropoulos, P. Nomikos

14:40 - 15:00

**PP\_Theme06\_09:** The Icelandic Glacier Tunneling System

H. Ö. Arngrimsson, R. Sævarsson

**Poster Station E**

14:00 - 14:20

**PP\_Theme06\_10:** Construction of Platform Tunnel by Conventional Tunnelling below Heritage Buildings

P. Singh, R. Mittal, S. K. Gupta, A. H. Khan

14:20 - 14:40

**PP\_Theme06\_11:** Tunnel construction under dense urban agglomeration - The Dwarka Najafgarh Metro Corridor

A. Sahu, A. Kumar

14:40 - 15:00

**PP\_Theme06\_12:** Conventional Excavation for widening of TBM bored tunnel by mechanical means for Shitladevi Station, Mahim

S. Vishwakarma, A. K. Rai, R. R. Kumar, D. Binnar, A. D. Shinde

## POSTER SESSION 3

Tuesday, May 16, 2023 14:00 – 15:00 Poster Area

## Poster Station F

14:00 - 14:20

**PP\_Theme07\_03:** The use of an Innovative Fiber Optic Methodology to Capture the Axial Response of Rib Spacing and Grout Annulus Effects on Grouted Rock Bolts

K. S. Moore, N. Vlachopoulos

14:20 - 14:40

**PP\_Theme07\_04:** Underground Replacement of a 100 Year Old Tunnel using the Sequential Demolition Method

G. J. E. Kramer, J. Habimana

14:40 - 15:00

**PP\_Theme07\_05:** Compressible linings solutions: a multi-scale mechanical and technical demonstration up to a full 6m diameter surface loading "accelerator" device

J. Zghondi, G. Armand, L. Kerner, B. Terrade, N. Dias, J. M. Bosgiraud

## Poster Station G

14:00 - 14:20

**PP\_Theme07\_06:** Innovative Steering of Tunnel Boring Machines

E. Nathanson, S. Mauerberger, G. Wehrmeyer

14:20 - 14:40

**PP\_Theme07\_07:** Long-term structural behavior of inner-city segmental tunnel linings investigated by an innovative structural monitoring

F. Rauch, O. Fischer

14:40 - 15:00

**PP\_Theme07\_08:** Innovative methodology for advanced structural condition assessment of tunnels

A. Parasyris, D. Bairaktaris

## Poster Station H

14:00 - 14:20

**PP\_Theme08\_01:** Deep learning methods for underground deformation time-series prediction

E. Ma, M. Janiszewski, M. Torkan

14:20 - 14:40

**PP\_Theme08\_02:** 3D Numerical Simulation of TBM Excavation for Predicting Surface Settlements - State of the Art

B. Kratz, P. Jehel, M. Tatin

14:40 - 15:00

**PP\_Theme08\_03:** Safety level assessment of segmental linings in rock

N. Gottardi, S. Freitag, G. Meschke

## Poster Station I

14:00 - 14:20

**PP\_Theme08\_04:** TunAID - Interactive simulation-based tunnel track design tool for mechanized tunneling in urban areas

Y. Zendaki, B. T. Cao, A. Alsahly, S. Freitag, G. Meschke

14:20 - 14:40

**PP\_Theme08\_05:** Data Science in TBM Tunneling: Use Cases, Benefits and Challenges

K. Glueck, K. Glab, J. Tröndle

14:40 - 15:00

**PP\_Theme08\_06:** Digital strategies and technologies in the management of existing railway tunnels

F. Forja, E. Moschetti, M. Calicchio, V. M. Grigoras, B. Boyaci

## Poster Station J

14:00 - 14:20

**PP\_Theme09\_16:** Decision support tool for resilience assessment of road tunnels

K. Anastassiadou, U. Bergerhausen, F. Lindström, C. Zulauf

14:20 - 14:40

**PP\_Theme09\_17:** Seepage mitigation in karst with customised grouting techniques; the rehabilitation case of Enguri pressure tunnel, Georgia

E. Christakis

14:40 - 15:00

**PP\_Theme09\_18:** Engineering Correlations for Critical Velocity Estimation in Road Tunnel Fires: A Comparative Assessment using CFD Tools

G. Papadima, D. I. Kolaitis

## POSTER SESSION 4

Tuesday, May 16, 2023 15:50 – 17:10 Poster Area

## Poster Station A

15:50 - 16:10

PP\_Theme01\_17: ATG Ceneri Base Tunnel: Driving Method and Production of Concrete Aggregates  
E. Catelli, P. Lanfranchi

16:10 - 16:30

PP\_Theme01\_18: On the mechanical behavior of underground pipeline with separated joints rehabilitated by cured in place pipe  
K. J. Shou, J. M. Hsu

16:30 - 16:50

PP\_Theme02\_11: Equivalent Material Modelling of Fractured Rock Mass Resonance Effects  
H. T. Holmes, C. Paraskevopoulou, M. Hildyard, K. Neaupane, D. P. Connolly

16:50 - 17:10

PP\_Theme02\_12: Tunnel portal design optimisation in tectonically disturbed and weathered gneissic rock masses  
F. Kritikou, C. Paraskevopoulou, V. Marinos

## Poster Station B

15:50 - 16:10

PP\_Theme03\_15: Structural safety of tunnels in case of fire based on CFD simulations  
M. Filus, T. Pappou, B. Protopsaltis, K. Diakakis, A. Giskas, K. Stokos

16:10 - 16:30

PP\_Theme03\_16: Effect of the rock mass disturbance due to the tunnel excavation on the tunnel loading, based on numerical simulation  
D. Georgiou, A. Benardos, P. Nomikos

16:30 - 16:50

PP\_Theme03\_17: Tunnel design guideline in cases of tunnel face pre-support by fiberglass nails and / or forepoling umbrella  
D. Georgiou, G. Georgakopoulos, E. Diakoumi, A. Malandraki

16:50 - 17:10

PP\_Theme03\_18: Effect of rock heterogeneity on the Convergence-Confinement curve during numerical analysis of underground excavation in discontinuous rock mass  
N. Lathourakis, P. Yiouta - Mitra

## Poster Station C

15:50 - 16:10

PP\_Theme03\_19: TBM excavation under existing operation railway: a practical example applied to the Brenner railway  
C. Iasiello, M. Aganetti, D. Maturi, D. Buttafoco, V. Perrotta Orgnani

16:10 - 16:30

PP\_Theme03\_20: Circular economy and reuse of excavated materials from TBM excavations  
D. Sebastiani, I. Bavasso, M. Amici, N. Valiante, M. Di Nauta, M. Santamicone, G. De Carli

16:30 - 16:50

PP\_Theme03\_21: Influence of Construction Joints on the Mechanical Behavior of Linings in Mountain Tunnels Acted on by External Forces  
K. Kawata, R. Okawa, R. Nakazato, T. Natsume, N. Isago, A. Fujii

16:50 - 17:10

PP\_Theme03\_22: Effect of spatial heterogeneity of geomechanical properties on stability of tunnel face  
Y. Okazaki, T. Fukuma, M. Ohya, S. Morimoto, H. Hayashi, M. Shinji

## Poster Station D

15:50 - 16:10

PP\_Theme04\_09: A non-conventional system for TBM recovery: abandonment of the shield and underground disassembly of the mechanical equipment and inner structures  
P. F. Coto, F. Domínguez Mayans, P. García de Haro, G. Zonghua, Y. Zhuangzhi

16:10 - 16:30

PP\_Theme04\_10: Development of a tension-resistant single pass segmental lining in high pressure tunnels. The experience of Snowy 2.0 (Australia)  
N. Valiante, H. Elgarhi, F. Lazzarin, R. Crapp, R. Stucchi

16:30 - 16:50

PP\_Theme04\_11: Tunnel linings made of precast concrete segmental rings - from design choice to installation and performance  
D. Marini, G. Venditti

## POSTER SESSION 4

Tuesday, May 16, 2023 15:50 – 17:10 Poster Area

**16:50 - 17:10****PP\_Theme04\_12:** Single and two-component grout as high-performance backfilling materialsA. Di Giulio, M. Di Felice, N. Valiante, G. De Carli**Poster Station E****15:50 - 16:10****PP\_Theme05\_05:** 3D numerical investigation of the bending moments acting on tunnel junctions constructed in fractured/weathered to very blocky rockmassF. Chortis, M. Kavvasdas**16:10 - 16:30****PP\_Theme05\_06:** Challenges faced during conventional tunneling in urban environment – Mumbai Metro Line 3A. Dorugade, G. Raju, S. Gupta**16:30 - 16:50****PP\_Theme05\_07:** Investigation of microfine cement both rheological properties and permeation in soilsK. Boschi, R. P. Castellanza, C. G. di Prisco, D. Grassi**16:50 - 17:10****PP\_Theme05\_08:** Blasting and vibration control for hard rock shafts in urban centersI. J. F. Teixeira, C. V. Chanquini, F. Abreu, P. Messa, L. B. Partelli**Poster Station F****15:50 - 16:10****PP\_Theme06\_13:** Tunneling Construction Challenges on Mumbai Coastal Road ProjectV. Surana, J. D. Celentano, G. V. R. Raju, M. M. Swami**16:10 - 16:30****PP\_Theme06\_14:** Semi-Analytical Prediction of Ground Surface Settlements due to EPB Tunnelling in KolkataH. Jain, T. G. Sitharam**16:30 - 16:50****PP\_Theme06\_15:** Construction of Headrace Tunnel of Vishnugad-Pipalkoti HE Project (444MW) in Extreme Geological Conditions: Issues and Challenges-A Case StudyR. K. Khali, S. Potnis**16:50 - 17:10****PP\_Theme06\_16:** Classification of fault zones in mechanized tunneling projectsF. Shayan, A. Uromeie, J. Hassanpour**Poster Station G****15:50 - 16:10****PP\_Theme06\_17:** The successful crossing of an extended fault zone in carboniferous squeezing rocks: a practical case from TELT's SMP4 construction siteM. Calorio, F. Franchetti, L. Rew, A. Counilh, A. Saitta, B. Serrano, C. Salot**16:10 - 16:30****PP\_Theme06\_18:** An integrated design approach for the renovation of masonry railway tunnels of Central Italy with ARCHITA and MIRETF. Foria, S. Gazzola, M. Calicchio**16:30 - 16:50****PP\_Theme06\_19:** North-West road bypass of Merano - South Tyrol - ItalyG. Barovero, M. Moja, E. M. Pizzarotti, F. Prati, J. Strimmer**16:50 - 17:10****PP\_Theme06\_20:** Design criteria for caverns under high stress rock conditions for Snowy 2.0 Power Station ComplexS. Khodr, P. L. Tonioni, P. Lignier, A. Lambrughli, M. Diederichs, I. Ching, F. Lazzarin**Poster Station H****15:50 - 16:10****PP\_Theme07\_09:** New products for rapid refurbishment of existing tunnelsD. Michelis, E. Dal Negro**16:10 - 16:30****PP\_Theme07\_10:** A new approach to measure the stress level in tunnel linings of the Italian highway networksG. Ascari, A. Dalle Fratte, A. Terraneo, C. Alessio, L. Baccolini**16:30 - 16:50****PP\_Theme07\_11:** Mobile mapping systems and Algorithms for Italian Tunnel AssessmenF. Iacobini, A. Pranno

## POSTER SESSION 4

Tuesday, May 16, 2023 🕒 15:50 – 17:10 📍 Poster Area

**16:50 - 17:10****PP\_Theme07\_12: Automation of tunnel lining construction with Self-Compacting Concrete: full-scale experiment and numerical simulation**K. Kato, H. Koyama, T. Hiromitsu, S. Fujiwara, C. Kuroda, N. Utagawa, T. Ono, Y. Uno**Poster Station I****15:50 - 16:10****PP\_Theme08\_07: Soft Ground Tunnel Lithology Classification using Resampling and Supervised Learning**K. Kilić, H. Ikeda, T. Adachi, Y. Kawamura**16:10 - 16:30****PP\_Theme08\_08: Development of simple floating dust sensor during tunnel construction using video image sequences – algorithm of automatic particle recognition**K. Tanaka, S. Nakashima, H. Hayashi, M. Shinji, K. Ide, N. Kishida**16:30 - 16:50****PP\_Theme08\_09: Development of a Ground Forecasting System Based on the Geological and Groundwater Conditions in Mountain Tunneling**T. Fukuda, S. Yoshikawa, K. Hosono, S. Iwanaga**16:50 - 17:10****PP\_Theme08\_10: Automated semantic segmentation of 3D point clouds of railway tunnel using deep learning**J. Park, B.-K. Kim, J. S. Lee, M. Yoo, I.-W. Lee, Y.-M. Ryu**Poster Station J****15:50 - 16:10****PP\_Theme09\_19: Time-dependent impact of expansive soil location on tunnels**A. Saqib, L. Changjian, C. Ying**16:10 - 16:30****PP\_Theme09\_20: Analytical study of anomalies in tunnel lining thickness: critical temperature variations**S. Aiello, V. De Biagi, B. Chiaia, C. Alessio, L. Baccolini, R. Fantuz**16:30 - 16:50****PP\_Theme09\_21: The strength of concrete in existing Italian tunnels**A. P. Fantilli, B. Chiaia, M. Giordano**16:50 - 17:10****PP\_Theme09\_22: A probabilistic approach to evaluate the risk due to a fire in unidirectional road tunnels ventilated by jet fans**D. Martinelli, P. Oreste

## POSTER SESSION 5

Wednesday, May 17, 2023 09:30 – 10:10 Poster Area

## Poster Station A

9:30 - 9:50

PP\_Theme03\_23: A 3-D finite element design of a tunnel temporary lining, under Archaeological area  
E. Zygouri, D. Bairaktaris

9:50 - 10:10

PP\_Theme03\_24: Reinforcement and Bonded Block Modelling  
G. A. Skarvelas

## Poster Station B

9:30 - 9:50

PP\_Theme03\_25: Analysis and numerical simulation of mechanical interaction between ground and elastic supporting elements for circular tunnel  
T. Nishimura, M. Kohno

9:50 - 10:10

PP\_Theme03\_26: Function of Reinforcement in Concrete Tunnel Linings  
R. Winterberg

## Poster Station C

9:30 - 9:50

PP\_Theme04\_13: Finite element analysis of surface settlement above TBM tunnels for Jakarta MRT project  
N. Yingyongrattanakul, S. Nagano, W. Maulina, T. Boonyatee

9:50 - 10:10

PP\_Theme04\_14: Development of environment-friendly tail grease for shield tunnelling method  
K. Yamashita, M. Hayashi, K. Matsubara, S. Arai, T. Arai, K. Takakuwa

## Poster Station D

9:30 - 9:50

PP\_Theme05\_09: Development and Application of Remote Monitoring Systems for Tunneling Works in Conventional Tunnel Construction  
K. Sakai, K. Mitani, T. Tani, S. Miyamoto

9:50 - 10:10

PP\_Theme05\_10: Application of Radar Measurement for Energy Efficient Blast Calculation by the tunnelling  
J. Ortuta, M. Bakoš, V. Greif

## Poster Station E

9:30 - 9:50

PP\_Theme05\_11: Montreal Metro Blue Line Extension Tunnels and Caverns  
V. Nasri, M. Bakhshi, G. Maurel, R. Saghaee

9:50 - 10:10

PP\_Theme05\_12: Modernization of a Century Old Mont-Royal Tunnel  
M. Motallebi, B. Esmaeilkhaniyan, V. Nasri

## Poster Station F

9:30 - 9:50

PP\_Theme06\_21: Stilling basin built in the form of ultra-large cross-sectional tunnel  
S. Igarashi, A. Fujimi, S. Murakami, K. Akiyoshi

9:50 - 10:10

PP\_Theme06\_22: Watertight Rail Tunnel Excavation and environmental Conservation of Wetlands Registered under the Ramsar Convention  
A. Kameyama, R. Kashiwagi, T. Ishida

## Poster Station G

9:30 - 9:50

PP\_Theme06\_23: Triple layered tunnel supports system against extremely high squeezing ground condition  
D. Awaji, R. Hase, K. Matsuo, S. Okubo, J. Nakamura

9:50 - 10:10

PP\_Theme06\_24: Case Study in the Construction of Tunnels on the Durango - Mazatlan Highway (Mexico)  
A. Ramírez-Piedrabuena, L. Cañete-Enríquez, W. Araújo-Quimbaya

## Poster Station H

9:30 - 9:50

PP\_Theme07\_13: Characteristics of laser ablation-excited vibrations in concrete  
N. Yasuda, T. Asakura

## POSTER SESSION 5

Wednesday, May 17, 2023 🕒 09:30 – 10:10 📍 Poster Area

9:50 - 10:10

**PP\_Theme07\_14:** Vision-based Measurement method with Segmentation for Concrete Tunnel Crack Inspection  
J. Kim, J. Park, G. C. Cho, S. Shim

**Poster Station I**

9:30 - 9:50

**PP\_Theme08\_11:** Stage-updated TBM operational parameter prediction model using random forest algorithm  
 D. Kim, K.-H. Lee, N. Y. Kim, K. Kwon, H. Choi

9:50 - 10:10

**PP\_Theme08\_12:** Estimation of uniaxial compressive strength at tunnel face using TBM operation data  
T. Y. Ko, T. H. Kim

**Poster Station J**

9:30 - 9:50

**PP\_Theme09\_23:** Tunnels revamping a compulsory necessity for the assessment of tunnels safety and duration  
M. Coli, M. Tanzini

9:50 - 10:10

**PP\_Theme09\_24:** Impact of Evacuees' "Psychological Profile" in Road Tunnel Fire Evacuation Simulations  
 D. Pikiokos, D. I. Kolaitis, K. Kirytopoulos

## POSTER SESSION 6

Wednesday, May 17, 2023 🕒 11:00 – 12:20 📍 Poster Area

**Poster Station A**

11:00 - 11:20

**PP\_Theme03\_27:** The importance of axisymmetric simulations for the estimation of tunnel support pressure for sequentially supported deep tunnels  
V. Gkikas, P. Nomikos

11:20 - 11:40

**PP\_Theme03\_28:** Design Challenges of Underground Highway Structures in Qatar  
 Y. Matsuo, G. Sergakis, T. Tzaveas

11:40 - 12:00

**PP\_Theme03\_29:** Ensuring face support and control of surface deformations in soft ground urban tunnels: Verification through international case studies  
S. Konstantis, G. Prountzopoulos, P. Spyridis

12:00 - 12:20

**PP\_Theme03\_30:** Numerical simulation of the mechanical behaviour and support of laminated discontinuous roof of underground excavations  
P. Yiouta-Mitra, E. Vougioukas

**Poster Station B**

11:00 - 11:20

**PP\_Theme03\_31:** Highway Tunnel Design Under River With Shallow Overburden-Terzili Tunnel Example  
B. Koçak, I. Sáenz de Santa María Gatón, C. H. Sentürk

11:20 - 11:40

**PP\_Theme03\_32:** Evaluation of subway stations from an architectural point of view  
Ö. Öztürk

11:40 - 12:00

**PP\_Theme03\_33:** Stress status of sprayed waterproofing membrane under groundwater pressure within composite SCL tunnels  
J. Su

12:00 - 12:20

**PP\_Theme03\_34:** Single and Double Tube Configurations for Transit Systems  
M. Sepehrmanesh, V. Nasri

**Poster Station C**

11:00 - 11:20

**PP\_Theme04\_15:** Successful usage of steel fibres in the Parisian Metro network expansion  
B. Rossi, P. Decobecq, A. Cornille, F. Delort, A. Bertrand

## POSTER SESSION 6

Wednesday, May 17, 2023 11:00 – 12:20 Poster Area

**11:20 - 11:40****PP\_Theme04\_16:** Development of waterjet drilling system with dual nozzles for graniteJ.-S. Park, H.-J. Cha, E.-S. Hong, T.-M. Oh**11:40 - 12:00****PP\_Theme04\_17:** Analysis of the disc cutters spacing in the face area of a small diameter TBMS. Y. Lee, K. I. Song, H. W. Ryu, K. N. Kang, D. G. Lee**12:00 - 12:20****PP\_Theme04\_18:** Numerical investigation of segmental lining with compressible layers in deep soft rockJ. Park, J. B. An, J. Kim, G.C. Cho**Poster Station D****11:00 - 11:20****PP\_Theme04\_19:** Refurbishment of a 15,2 M TBM (S19 Rzeszow Poludnie – Babica project) 17 years after its first use (M-30 Madrid project)F. Vara, M. Calero**11:20 - 11:40****PP\_Theme04\_20:** Effect of cutting speed on conical pick cutter performance obtained from portable linear rock cutting machine (PLCM)C. Balci, F. Shoaei, D. Tuncak, H. Copur**11:40 - 12:00****PP\_Theme04\_21:** Comparison of two identical EPB TBMs under different and complex geological conditionsI. S. Binen, F. Kara, M. Temur, M. Cinar, U. Ates**12:00 - 12:20****PP\_Theme04\_22:** Validity of Stickiness and Consistency Index in Assessment of Cutterhead Clogging Potential of Cohesive SoilsR. Shetty, A. Eisenman, S. Lopez, M. A. Mooney**Poster Station E****11:00 - 11:20****PP\_Theme06\_25:** Condition Assessment Survey and Repair Work of the Headrace Tunnel for the Warangoi HPPB. Ashcroft, B. Børresen, F. Mamia, L. Labe**11:20 - 11:40****PP\_Theme06\_26:** Impacts and challenges faced during deep excavation 1125.3m, rock encountered its effects on support and solution: A Case Study Review from Suki Kinari Hydro Power Project 870 MW PakistanH. Waheed, A. Riaz, A. Hussain, A. Q. Khan**11:40 - 12:00****PP\_Theme06\_27:** Collapse of a pressurized subsea tunnel in cohesive marine depositsS. H. Kim, K. H. Kim, D. H. Kim, S. H. Kim, J. H. Shin**12:00 - 12:20****PP\_Theme06\_28:** Investigation of the effect of ground freezing on shield tunnel restorationS. Park, C. Hwang, S. Yang, H. Choi, T. Y. Ko, Y. Son**Poster Station F****11:00 - 11:20****PP\_Theme06\_29:** Challenges in the Construction of a Tunnel Under Crossing a Channel in SingaporeZ. Chen, T. Y. S. Chew, C. W. Wan, D. Loh**11:20 - 11:40****PP\_Theme06\_30:** Evaluation of Over-Excavation for Earth Pressure Balance (EPB) Shields through Data AnalyticsC. Teo, Y. L. Paterson, J. Kumarasamy, Y. H. Zhang**11:40 - 12:00****PP\_Theme06\_31:** A case study on design and construction of mined tunnel in challenging ground conditions in SingaporeY. Jinrong, M. Claudia, K. Sharique, G. Venkatesh**12:00 - 12:20****PP\_Theme06\_32:** Design challenges and construction experience of the main tunnels of Brescia-Verona high-speed railwayD. Merlini, M. Tanzini, F. Avesani, M. Falanesca, R. Rutigliano, A. Anania, M. Laffranchi



## POSTER SESSION 6

Wednesday, May 17, 2023 🕒 11:00 – 12:20 📍 Poster Area

**Poster Station G****11:00 - 11:20****PP\_Theme06\_33:** Repurposing of reception shaft, Mumbai Coastal Road Project – Case studyA. Di Fabio, A. Panciera, M. Varma, S. Kumar, P. Kachhy, S. Singh, S. Pajni**11:20 - 11:40****PP\_Theme06\_34:** Zhinvali HPP tailrace tunnel maintenance: investigations, design and works implementation under challenging constraintsB. M. Quigley, A. Arigoni, S. Liccardo, G. Matcharadze**11:40 - 12:00****PP\_Theme06\_35:** Experiences on the Use of GBR in Tunnel and Cavern ProjectsC. S. Lau, A. Dematteis, R. Ovena, A. Di Fabio**12:00 - 12:20****PP\_Theme06\_36:** TBM excavation under high water pressureR. Schuerch, P. Perazzelli, M. Piemontese, M. Scialpi**Poster Station H****11:00 - 11:20****PP\_Theme07\_15:** The benefits of InSAR monitoring during the construction of the Ceneri Base TunnelD. Stocker, D. Merlini, M. Falanesca, A. Del Col, C. Gervasi, I. Iannicella**11:20 - 11:40****PP\_Theme04\_23:** Increasing safety in small-diameter tunnelling: the role of automation and microtunnellingP. Schmah, M. Lübbers, F. Seng**11:40 - 12:00****PP\_Theme04\_24:** Penetration behaviour of slurry in saturated soil – analysis of particle deposition on the basis electrical resistanceS. Kube, B. Schoesser, M. Thewes**12:00 - 12:20****PP\_Theme07\_16:** Underwater Car Keeps Current FlowingM. Short, S. Drobny**Poster Station I****11:00 - 11:20****PP\_Theme08\_13:** Reduction of risks and operation improvement in TBM tunneling through advanced techniques of data management, processing and analysisE. París, S. Arrate**11:20 - 11:40****PP\_Theme08\_14:** Optimization of shield tunneling parameters under controlled surface settlementsP. Jongpradist, S. Wainiphithapong, C. Phutthananon**11:40 - 12:00****PP\_Theme08\_15:** Investigating the effectiveness of transfer learning in rock strength predictionA. L. J. Khoury, C. Paraskevopoulou, A. Benardos**12:00 - 12:20****PP\_Theme08\_16:** Establishing the digital engineering approach for the UKs Geological Disposal Facility: Aligning a major capital programme in the nuclear sectorto adopt ISO 19650, enabling BIM  
D. Garbutt, A. McCabe, A. Nawell, A. Gigante Barrera, D. Ruikar**Poster Station J****11:00 - 11:20****PP\_Theme09\_25:** Estimation of permanent lining stress of road tunnel by ultrasonic velocityT. Ishimura, A. Kusaka, N. Isago**11:20 - 11:40****PP\_Theme09\_26:** Evaluation of Mechanical Behavior of Hanging and Anchorage System supporting Jet Fan for Safety of Road TunnelsY. Koizumi, A. Kusaka, Y. Tatsumi**11:40 - 12:00****PP\_Theme09\_27:** Performance and monitoring results of repair work to prevent chloride attack in operating subway tunnelsY. Mutou, S. Nakamura, N. Ogura**12:00 - 12:20****PP\_Theme09\_28:** Design of stress level for accelerated life test of HLW repository sensorC. Park, H.-J. Hwang, G.-C. Cho, C.-H. Hong

## POSTER SESSION 7

Wednesday, May 17, 2023 🕒 14:00 – 15:20 📍 Poster Area

**Poster Station A**

14:00 - 14:20

**PP\_Theme03\_35:** Design aspects of deep water distribution shafts  
 N. Allahverdi, V. Nasri

14:20 - 14:40

**PP\_Theme04\_25:** Design of Orange Line Project in Austin, Texas

T. Malouf, A. Bhargava, V. Nasri

14:40 - 15:00

**PP\_Theme03\_36:** Design and construction of internal structures of Montreal REM Airport Tunnel using precast steel fiber reinforced concrete units

M. Rabiei, M. Bakhshi, V. Nasri

**Poster Station B**

14:00 - 14:20

**PP\_Theme06\_37:** Study into the TBM jamming hazard in Opalinus clay

A. N. Nordas, M. Natale, G. Anagnostou, L. Cantieni

14:20 - 14:40

**PP\_Theme06\_38:** Problems derived from designing tunnels in loose soils with rock mass methodologies

N. Della Valle, P. García de Haro, B. Koçak

14:40 - 15:00

**PP\_Theme06\_39:** The performance of an EPB-TBM in a complex geology with frequently encountered dykes and in transition zones

M. Aymir, İ. Yağcıoğlu, B. Türker, N. Bilgin

15:00 - 15:20

**PP\_Theme06\_40:** Tunnelling in challenging topography and geological conditions for a railway doubling project in Eastern Ghats, India

S. S. Nirmal, L. Kumar, A. Shaz, R. Gupta

**Poster Station C**

14:00 - 14:20

**PP\_Theme06\_41:** Hybrid SCL and Handmined Shaft - A Case Study from the Bank Station Upgrade Project

A. Nasekhian, Z. Ng, G. Savage, S. Macknight

14:20 - 14:40

**PP\_Theme06\_42:** Design Aspects of Swelling of Shales for Tunnelling Projects in Southern Ontario, Canada

M. Rahjoo, V. Nasri, M. Sepehrmanesh, M. Soudkhah

14:40 - 15:00

**PP\_Theme06\_43:** Construction of the First Street Connector Tunnel as part of the Northeast Boundary Tunnel Project in Washington D.C.

B. Giurgola, F. Azzarà, F. Bonaiuti, N. Fuegenschuh

15:00 - 15:20

**PP\_Theme06\_44:** Ground Freezing for Deep Shaft Excavation Shaft 17B-1 New York City Water Tunnel No. 3 New York, New York

J. Sopko

**Poster Station D**

14:00 - 14:20

**PP\_Theme04\_26:** Design of FRC Precast Segments for Fire in Light-Rail Tunnels

M. Bakhshi, M. Partovi, A. Haghighat, V. Nasri

14:20 - 14:40

**PP\_Theme03\_38:** REM de l'Est Project in Montreal

V. Nasri, M. Sepehrmanesh

14:40 - 15:00

**PP\_Theme09\_29:** Self-Rescue in Traffic Tunnels - Simulation Method

M. Bettelini

15:00 - 15:20

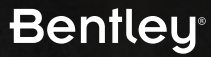
**PP\_Theme09\_30:** Tunnels and Underground Stations Ventilation System

A. Haghighat, N. Shahcheraghi, V. Nasri

## POSTER SESSION 7

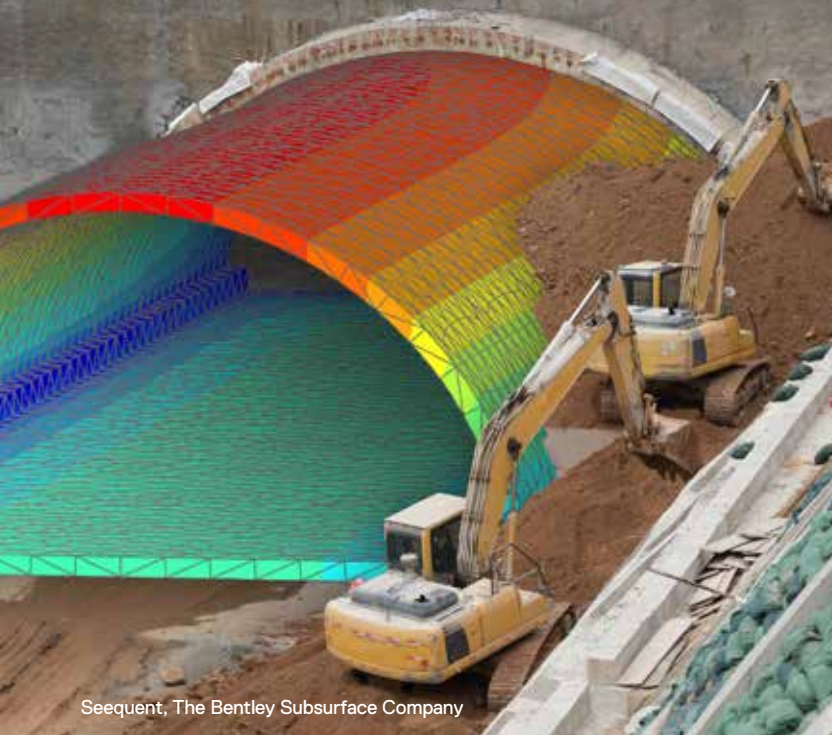
Wednesday, May 17, 2023 🕒 14:00 – 15:20 📍 Poster Area

**Poster Station E****14:00 - 14:20****PP\_Theme09\_31:** Shaking table test of segmental linings with ground-penetrating shield tunnel (GPST) under transverse excitationsQ. Wang, Y. Yuan**14:20 - 14:40****PP\_Theme04\_27:** Fundamental TBM selection criteria in urban environment based on engineering geological and geotechnical conditionsD. Papouli, V. Marinos**14:40 - 15:00****PP\_Theme09\_33:** Risk management process for underground worksG. Armetti, A. Panciera**Poster Station F****14:00 - 14:20****PP\_Theme08\_17:** Near Surface Full Waveform Inversion via deep learning for subsurface imagingA. Parasyris, L. Stankovic, S. Pytharouli, V. Stankovic**14:20 - 14:40****PP\_Theme08\_18:** A novel holistic approach to rehabilitation of underground structuresV. Gall, T. Martin, L. Boyd**14:40 - 15:00****PP\_Theme08\_19:** BIM Implementation in a Major Tunnel RehabilitationT. Vovou, H. Bosques-Mendez, V. Nasri**Poster Station G****14:00 - 14:20****PP\_Theme10\_05:** Lessons learned procuring a high availability tunnel asset for the A303 StonehengeD. R. Hull**14:20 - 14:40****PP\_Theme10\_06:** Introducing the ATOM risk management methodology for managing risks in heavy subway projects - The middle section of the Tehran Metro L6 & Tehran-Eslamshahr subway phase 1B. Mardani Givi, A. Akbarpour, Z. S. Hashemi, H.R. Abbassian Jahromi, S. Mousazadeh**14:40 - 15:00****PP\_Theme10\_07:** Tunnel Assessment: the Italian caseG. Lunardi, G. Cassani, M. Gatti, A. Amadi, A. Marchiondelli, M. Malacalza, A. Vitiello, S. Verga, C. Nardone, A. Sella**15:00 - 15:20****PP\_Theme10\_04:** Tunnel and Underground Works: Managing insurance particulars in a well-structured and risk-averse environmentT. Konstantis, A. Towers**Poster Station H****14:00 - 14:20****PP\_Theme08\_20:** Comparison between Machine Learning Algorithms for TBM Advance Rate PredictionS. Huang, P. Dastpak, M. Esmaeilpour, K. Liu, R. L. Sousa**14:20 - 14:40****PP\_Theme08\_21:** Study on the Digitalization of Tunnel Inspection Using Deep LearningY. Ohara, T. Nakayama, A. Miwa, T. Shimizu**14:40 - 15:00****PP\_Theme06\_45:** Non-open-cut tunnel construction technology and monitoring system for railway underpassA. Miwa, Y. Ohara, T. Ushida, T. Shimizu, T. Nakayama



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# TECHNICAL VISITS

Different Technical Visits will take place during WTC2023. **Cost per person € 20.** Please contact the registration desk to purchase a ticket, limited seats will be available onsite.

Additional information will be available through the conference APP. All technical visits will depart from the Congress Venue.

*Check Technical Visits program online  
Scan the QR code*



# Thursday, May 18, 2023

## 1. Athens Metro Line 4

The first phase of Line 4 (from Alsos Veikou to Goudi areas) is being constructed fully underground by the joint venture "AVAX AE - GHELLA SpA - ALSTOM TRANSPORT SA" following a tender award on 2021 from the Project Owner ATTIKO METRO S.A.

### Main features of the Project:

- ✓ 12.8km line: double track TBM tunnel
- ✓ 15 underground stations with platform screen doors
- ✓ 9 intermediate or terminal shafts
- ✓ 2km underground forestations, underground trumpet structures and connecting tunnels
- ✓ A new Operation Control Center
- ✓ A new repair workshop in the existing Depot area
- ✓ Underground Train stabling and maintenance yards at both ends of the Line
- ✓ Transfer connections at two existing Stations (Line 2 & Line 3)
- ✓ 20 new 4-car automated driverless trains.

*The Project's estimated cost is 1,510,000,000.00 € and the estimated delivery time is 96 months.*

Among the technical challenges of this Project is TBM tunneling under existing Metro tunnels and excavation of new stations close to operating Metro stations whose safety and activities should remain unaffected. Furthermore, boring or digging under or next to high buildings, sometimes old or historical ones in the city center, has to be performed securing their structural and serviceability standards. The risk of coming across archaeological findings during excavation works is always high in the Athens area and the issue of how to protect them while not impeding the works is of great importance.

**The tour will start with a presentation of the Project at a construction site office. Delegates will then visit a number of worksites to view tunnelling works and construction of stations, shafts etc.**

**It is expected that by the time the Technical Visits take place, TBM tunneling works will have started and construction of cut & cover structures (stations, vent. shafts) as well as conventional tunneling will be in progress.**

Thursday, May 18, 2023



*TBM cutter-head inspection*



*Akademia Station preparatory works*



*Katehaki Shaft – boring of piles for retaining walls*

**Cost per person : 20.00 €**

*\*limited participation on a first come first served basis*

**Thursday, May 18, 2023**

## 2. Underground Construction of National Railway Line in Athens

The Greek Public Railway Construction Company (ERGOSE) assigned in 2018 the construction of a four-track rail corridor, 2.36 km long of which approx. 1.9 km is fully underground, starting from the Athens Central Railway Station and ending at Sepolia area, in Athens Municipality. There the line connects to the new four-track rail corridor which was recently completed and opened to traffic. The rail corridor mostly runs within the occupation zone of the existing open air train tracks. The east half of the four-track corridor will serve suburban trains, whereas the west half will be used mainly for intercity services.

The project schedule has to provide for a number of constraints such as maintaining the existing surface train operation, safe construction close to adjacent buildings, close overpassing a Metro running tunnel and a Water Authority (EYDAP) culvert. The integrity and serviceability of all those structures is to be secured during the works, therefore modern instrumented monitoring is implemented.

When finished, the surface area above the underground corridor will serve 9 vertical streets which are currently interrupted due to the on-ground corridor. Moreover, landscaping will provide citizens with recreation areas of green (trees, shrubs).

Works are in full progress by the Contractor "J/V INTRAKAT SA – SIDIRODROMIKA ERGA ATE" and Phase A is to be completed by 2024, while the whole project will be delivered by the end of 2025.

Following a brief presentation of the Project, we will visit a worksite to see construction work of the underground part of the Line. It will be a half-day visit.

**Cost per person : 20.00 €**

\*limited participation on a first come first served basis



Thursday, May 18, 2023



**Thursday, May 18, 2023**

### 3. The Hellinikon Project – Underground Coastal Road

The revitalization of the former Hellinikon Airport area is the biggest project of its kind in Europe and the most ambitious development project ever undertaken in Greece that will positively impact the local and national economy. It combines urban development, recreation facilities, a huge metropolitan park and seafront full accessible to the public. Access through metro and tram lines will be assured while the existing road along the shoreline will be reconstructed to become fully underground.

The Project of the Underground Coastal Road was assigned by the Owner LAMDA DEVELOPMENT to the Contractor AVAX SA and excavation works have already started. The underground road will begin at the area of Alimos and rise to surface at Ag. Kosmas marina. The purpose of this Project is to allow connection of the seashore front to the rest of the Hellinikon area.

The tour includes presentation of the Hellinikon Project at the Company's office and then walk the delegates around the various worksites in the area especially in the underground coastal road.

Thursday, May 18, 2023



Cost per person : 20.00 €

\*limited participation on a first come first served basis

**Thursday, May 18, 2023**

## 4. DionysoMarble – Underground exploitation of Pentelikon Marble

The famous marble that was used for the construction of the Parthenon in the 5th century BC is a deposit in the Mt. Pentelikon in Attica, about 20 km from Athens. In the ancient times, the huge pieces of stone had to be hauled to the building site by oxcart. The roadway used was a continual downhill, and followed the natural inclination of the land.

Pentelikon marble is currently exploited by Dionyssomarble who holds a leading position in the production, processing and trade of marble and other ornamental stone, marble dust and calcium carbonate filler. The increased demand for dimension stone in combination to quarrying in an environmentally sensitive area, has led the company to exploit part of its deposit using underground methods to minimize their environmental footprint.

To achieve this goal, the company participated in a three-year research program of the European Union, in the period 1999 – 2001. In cooperation with academic institutions and mining industries from EU countries, an integrated methodology of planning and programming for underground marble mining was developed.

The exploitation method is room and pillar with openings up to 15 meters wide, while the maximum height of the excavations is 30 meters. Following studies and simulations in collaboration with the School of Mining Engineering of the NTUA, preventive support measures (anchors) are implemented.

During the visit at Dionyssomarble, there will be an initial briefing by the company on site, its history and achievements and description of both the surface and underground mining methods. A visit to the quarry with emphasis on the underground excavations area will follow. A visit of the processing plant and the exhibition will conclude the excursion.

**Cost per person : 20.00 €**

\*limited participation on a first come first served basis

Thursday, May 18, 2023



**Thursday, May 18, 2023**

## 5. Athens Metro Lines 2 & 3: Operations Control Centre

The Operations Control Centre (OCC) for Metro Lines 2 & 3 is located at the Syntagma Station, in the heart of Athens. It is the complex centre of train controls, communication, information & reports collection by the staff. It is the point where instructions are passed on to staff on site and where the overall co-ordination for a safe and effective operation on a 24/7/365 basis is performed.

Access to the visit location will be by actually riding Metro Lines 2 or 3 depending where the attendee is – from the Congress venue, go to the nearby Megaro Moussikis Station and take trains going toward Dimotiko Theatro Station, then get off at Syntagma Station and ascent to Concourse Level.

During the visit, the tasks of the OCC will be analyzed and the visitors will have an exclusive view of systems such as supervision and control of the signalling system, train movements, power and environmental system. An authority official of the Athens Metro will provide in-depth details of communication and co-ordination of all local staff as well as emergency services in case of an incident and restoration of traffic after the incident is over. Delegates will have the opportunity to ask questions about the various topics of operation and controlling of the Metro Lines. At the end of the visit, coffee and refreshments will be offered.

***Estimated visit time at the OCC room:  
1 – 1:30 hours (excluding delegate travel time)***

**Cost per person : 20.00 €**

*\*limited participation on a first come first served basis*

Thursday, May 18, 2023



CONTACT

**SOCOTEC**

infrastructure@socotec.com



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- › Vulnerability of existing structures
- › External validation of studies and works
- › Site ventilation
- › Instrumentation and monitoring

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\*Testing Inspection Certification



## About Athens

**The city of Athens is much more than what it seems.**

The cradle of democracy and civilization: yet, beyond its rich history, Athens is a vibrant modern European city with an old-town feel; ancient monuments fuse with a trendy, cosmopolitan scene. Masterpieces of significant architectural values stand tall today in a harmonious coexistence with impressive modern buildings.

German architect Ernst Ziller designed some of Athens' most iconic buildings, giving the city the architectural identity and aesthetics needed as the capital of the new Greek state. The Presidential Mansion, Iliou Melathron (which houses the Numismatic Museum of Athens today), the National Theater, and the National Archaeological Museum give only a small example of Ziller's heritage. On the other hand, modern buildings of high architectural value such as the House of Letters and Arts, the New Acropolis Museum, the Cultural Center-Stavros Niarchos Foundation, and the National Art Gallery remind us that Athens is a part of the 21st century.

In 1981, Athens hosted the ceremonial signing of Greece's accession to the European Union, while four years later, in 1985, the city was inaugurated as the first European City of Culture. At the dawn of the 21th century, Athens hosted the 2004 Olympic Games, a landmark in modern history, as the Games returned to their birthplace.

This event gave rise to the construction of large modern infrastructure such as the International Airport "Eleftherios Venizelos", the Metro, and the Attiki Odos highway. These and many more infrastructures represent the modern aspect of Athens.

This is why the capital of Greece is a unique travelling destination, especially for conferences: the city of Athens ties its past, present, and future into one exciting experience.

*This is what makes Athens timeless*



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**GENERAL  
INFORMATION  
FROM A to Z**



## >> A

### APP

#### Android devices

Search for “The Event App” by EventsAIR on PlayStore. When you are prompted for a code upon launching the App, insert **wtc2023**

#### iOS devices

Search for “The Event App” by EventsAIR on AppStore. When you are prompted for a code upon launching the App, insert **wtc2023**.

The Mobile App will be live two weeks before the congress.



## >> C

### CERTIFICATES OF ATTENDANCE

A Certificate of Attendance will be sent to all registered participants after the Conference via email.

### CONGRESS DATES

Friday, 12 May to Thursday, 18 May 2023

### CONGRESS VENUE

#### Megaron Athens International Conference Centre (MAICC)

Vas. Sofias avenue & Kokkali street, Athens 115 21, Greece  
T. +30 210 7282000



The MAICC is distinguished as one of the leading and most technologically advanced conference venues in Europe. A building of modern architecture, dominates imposingly with its Doric austerity on the main avenue of Vassilisis Sofias. Right in the heart of the city, only a few minutes away by foot from Syntagma square -the main square of the city- and easily accessible by all means of

transportation. The Metro station is located a few meters away from the main entrance of the MAICC. It is also very close to major hotels, museums, shops, and fine restaurants, many of which are within walking distance.

## CSR



**Make a  
Donation  
ONLINE!**



**Learn more  
about the  
Symbolic  
Marathon!**



ELEPAP (Rehabilitation for The Disabled) is the largest charitable non-profit organization in Greece that provides comprehensive support for children with motor disabilities and neurodevelopmental disorders. It provides innovative, constantly-evolving methods of education and rehabilitation, aiming for every child to reach their maximum potential and to integrate smoothly and equally into the social fabric.

In the context of the Conference's Social Responsibility, delegates can support ELEPAP while participating in the Symbolic Marathon that will be held on Thursday May 18th, at the unique cultural monument of Panathenaic Stadium.

## CURRENCY / EXCHANGE

The Greek currency is euro (EUR). Exchange offices and Banks are located all around the city centre.



## ELECTRICITY

The electrical power supply voltage in Greece is 220-240 Volts (US/Canada: 110-120 Volts).

## EMERGENCY CONTACTS

**Police:** 100

**Fire department:** 199

**Medical emergency (ambulance):** 166

**European emergency contact number (all above):** 112

## ENVIRONMENTAL POLICY

The WTC2023 Conference is observing an environmentally friendly policy. In this context, every effort has been made from preparation to realization of the Congress, to minimize impact on the environment. The Organizing Secretariat observes an in-house recycling policy, and offices are hosted in energy saving premises. Venue selection has taken into account easy access through a variety of public transportation environmentally friendly choices, thus minimizing carbon footprint.



## EXHIBITION OPERATING HOURS

All exhibitors are listed in the Program Book (see Industry Section and Venue Floorplans). The exhibition will run during the following hours:

### On Site Exhibition

<b>Day 1</b>	Monday, 15/05/2023	12:30-18:00
<b>Day 2</b>	Tuesday, 16/05/2023	08:00-18:00
<b>Day 3</b>	Wednesday, 17/05/2023	08:00-17:30

### Virtual Exhibition

<b>Day 1</b>	Monday, 15/05/2023	08:30-18:00 EEST
<b>Day 2</b>	Tuesday, 16/05/2023	08:30-18:00 EEST
<b>Day 3</b>	Wednesday, 17/05/2023	08:30-18:00 EEST



## FOOD & BEVERAGES

Coffee or Lunch during official breaks is included in the delegate registration fee and will be served in designated catering stations in all Congress areas.



## HYBRID FORMAT

Overcoming the pandemic crisis, we are excited to be able to organize a physical event with interaction and full of networking opportunities in the beautiful and historic capital of Greece, Athens. Thanks to flexible technology provided to us, the Organizers have adapted the new trend in congresses structure: the WTC2023 will be held in a hybrid format. It will be mainly a Congress with physical attendance; nevertheless, it will also have a strong digital presence with participation of high-level attendees. Physical participation is encouraged so that this Congress makes a strong statement marking the reopening of face-to-face interaction and networking. All Congress sessions can be watched live via the WTC2023 virtual platform, by clicking on the session's name, where you can find more information and the livestream itself.

**Live Support:** A Live Support system will be available for all attendees who will participate in the Conference, in order to resolve any technical issues that may arise and/or provide guidance through the platform.

**IMPORTANT NOTE**  
*WTC2023 sessions will be recorded and made available for post-viewing for a period of two (2) months following Congress dates.*



**Meeting Hub:** You will be able to contact all participants and interact with your colleagues through the Meeting Hub section.



## **INTERNET ACCESS**

Wifi will be available in all Conference areas.  
Network: **WTC 2023**



## **LANGUAGE**

English is the official language of the WTC2023. No simultaneous interpretation is provided.

## **LIABILITY AND INSURANCE**

Registration fees do not include participants' insurance against personal accidents, sickness and cancellations by any party, theft, loss or damage to personal possessions. Participants are requested to make their own arrangements with respect to health and travel insurance. The Greek Tunnelling Society and the Congress Organizer Convin SA accept no liability.



## **PHOTOS**

Photos of sessions and Conference areas will be taken during the WTC2023 Conference. Attendees are advised to contact the Registrations Desk, for any issue or objection with this respect.

## **PRESS OFFICE**

Members of the Press are welcome to register and receive the delegate material from the Registration Desk. Interviews and other Conference material will be made available upon request and through the official social media of the Congress and its Organizers.



## **SELF-CHECK-IN STATIONS**

Conference delegates who do not have outstanding payments may collect their name badges through the Self-check-in stations, located near the main entrance of the Conference venue, thus avoiding queues for badge pick-up.

## **SOCIAL RESPONSIBILITY**

WTC2023 promotes Corporate Social Responsibility taking and supporting actions and initiatives which reflect our



identity and sense of responsibility to society and people. No portion of food wasted: The partner catering company will donate all leftover food portions to the non-profit organization Boroume. Its mission is to reduce food waste and to fight malnutrition in Greece. Through the “Saving & Offering Food” program they save food on a daily basis from many sources and they offer it to charities that help people who are facing food insecurity. Their actions help the most vulnerable in our society as well as the environment by reducing organic food waste.

## SUSTAINABILITY

WTC2023 aims to minimize the environmental impact of the event and contribute towards a safe and healthy environment, implements numerous measures, from the planning of the event to execution and from the moment you start looking into your travel arrangements until you are back from the conference. This Congress aspires to bring about sustainable solutions, to act as an inspiration and to raise the level of both learning and awareness, so that the positive impacts will outweigh the negative.

- ✓ We select local suppliers to avoid long distance transport of goods and people.
- ✓ We avoid printing and aim for an almost paperless office
- ✓ We offer contactless check-in for delegates and congress visitors.
- ✓ We reduce energy consumption by applying LED lighting and screens.
- ✓ We reduce the number and variety of amenities.

### Travel:

- ✓ Use public transport instead of a taxi when navigating through Athens.
- ✓ When using a taxi, you might think of sharing it with one of your fellow delegates.

### Hotel:

- ✓ Only use the air conditioning if it is necessary.
- ✓ Turn off the lights and TV when leaving the room.
- ✓ Select the type and amount of food during meals sensibly to avoid food waste.



## TAXI SERVICES

Delegates can hire taxis at the taxi station located across the Congress Venue or address the Hospitality Desk for orders by phone.

## TELECOMMUNICATIONS

There are 3 main GSM operators in Greece: Cosmote, Vodafone, and Wind. The protocols for digital mobile telephone transmissions are based on GSM technology, operating at the frequencies of 900 and 1800 MHz. Please contact your provider for further details.

## TIME

Athens follows UTC/GMT +3 hours during the spring period.

## TIPPING

In restaurants, hotels, taxis or other services, tipping is optional, and customized per case, depending on whether you are pleased with the service. Approximately 5% of the bill is a good guideline.



## WEATHER

The weather in Athens in May is sunny and pleasant, with average temperature ranging between 20°C (68°F) & 25°C (86°F).



## REGISTRATION BADGES

Registration badges will be used during the WTC2023 Congress. Participants will receive their badges upon check-in at the Registrations Desk. For identification purposes and admission to scientific sessions, participants are requested to wear their badges at all times. Admission to Congress areas will not be allowed without badge identification.

## REGISTRATION & HOSPITALITY DESK

The Registrations Desk and Onsite Secretariat is located near the main entrance of the Congress Venue.

### Operating hours:

Sunday 14/5/2023	→ 07:30-17:30
Monday 15/5/2023	→ 08:00-17:30
Tuesday 16/5/2023	→ 08:00-18:00
Wednesday 17/5/2023	→ 08:00-18:00

The Hospitality Desk will be operating near the Registrations Desk, offering services to delegates that could facilitate their travel arrangements and make their stay in Athens as pleasant as possible, including information about hotels and the city.

## Professional Congress Organizer




K. Varnali 29, 15233, Athens, Greece

☎ +30210 6833600, ✉ info@wtc2023.gr, 🌐 www.convin.gr

The AVAX logo is rendered in a bold, blue, sans-serif font. The letters 'A' and 'V' are connected, as are 'A' and 'X'. The 'V' and 'X' are also connected. The logo is centered within a light gray square background.

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# Social events



## Welcome Reception

WTC2023 Welcome Reception will be held on May 14th, 2023 at 19:30 at Congress Venue, Foyer Labrakis (Level 1).



## Conference Dinner

WTC2023 Conference Dinner will be held at the idyllic event space of Golf Prive, at the south suburban of Athens, distinguishing for offering a range of rooms, dining areas and private venues for exclusive functions, on Wednesday, May 17th, 2023 at 20:00. Busses will depart from the Conference Venue at 19:30. Cost per person € 140. Please contact the registration desk for additional information.



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# WTC2023

## Athletic Events

In an athletic spirit, WTC 2023 Organizing Committee invites delegates to participate in two exceptional athletic events which will be held in Athens as parallel activities of the Congress.

### 1 Cricket Competition

The Tunnelling Societies of Australia and Greece invite you to an athletic event that unites nations on a cricket pitch! During the World Tunnelling Congress of 2023, on May 17th, we welcome our latest Member Nation Pakistan with a cricket competition! All Member Nations are welcome to join us! Teams may comprise 3-6 participants, equipment will already be available. Check out the video below for more.

**Wednesday, May 17th, 2023**

🕒 8.30 AM Departure from the Congress Venue by Shuttle

📍 Platon School *El. Venizelou St., 15354, Glyka Nera*

### 2 Symbolic Marathon

Join us in a symbolic marathon at the unique cultural monument of Panathenaic Stadium which served for the revival of the Olympic Games. The event that will include a run of 10 laps, will be held on Thursday, May 18, 16:00 – 18:30, with arrival time set for 15:00.

In the context of the Conference's Social Responsibility, the specific activity will support the brave children of ELEPAP (Rehabilitation for The Disabled) as the participants will choose during their registration the amount with which they wish to contribute to the organization's work.

**Thursday, May 18th, 2023**

🕒 16.00 (GMT+03:00 | Local Time)

📍 Panathenaic Stadium  
*Vasileos Konstantinou Anevue, Athens, 11635*



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- VENTILATION



# ITA-AITES WTC 2023

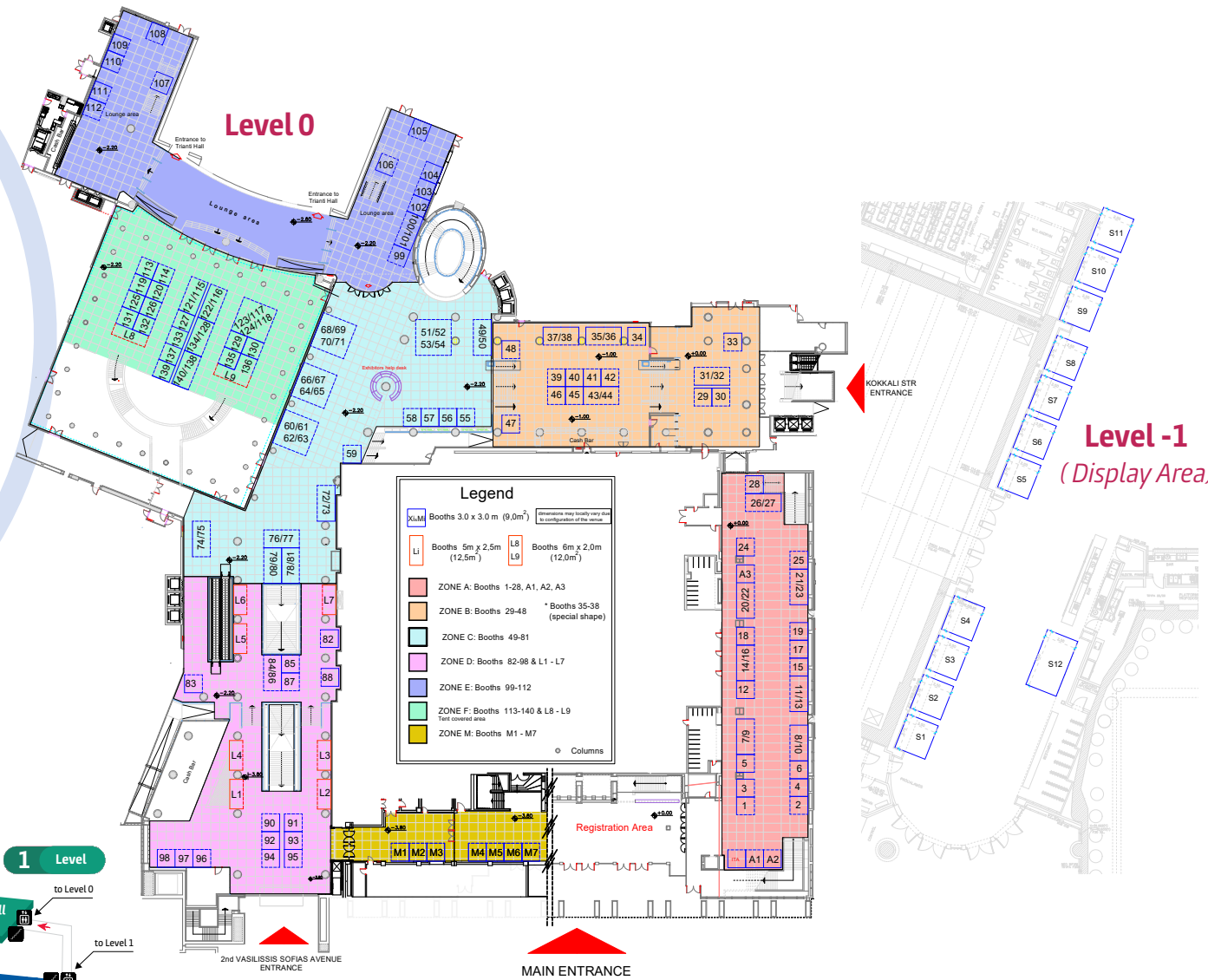
Expanding Underground Knowledge & Passion to Make a Positive Impact on the World

12-18 May

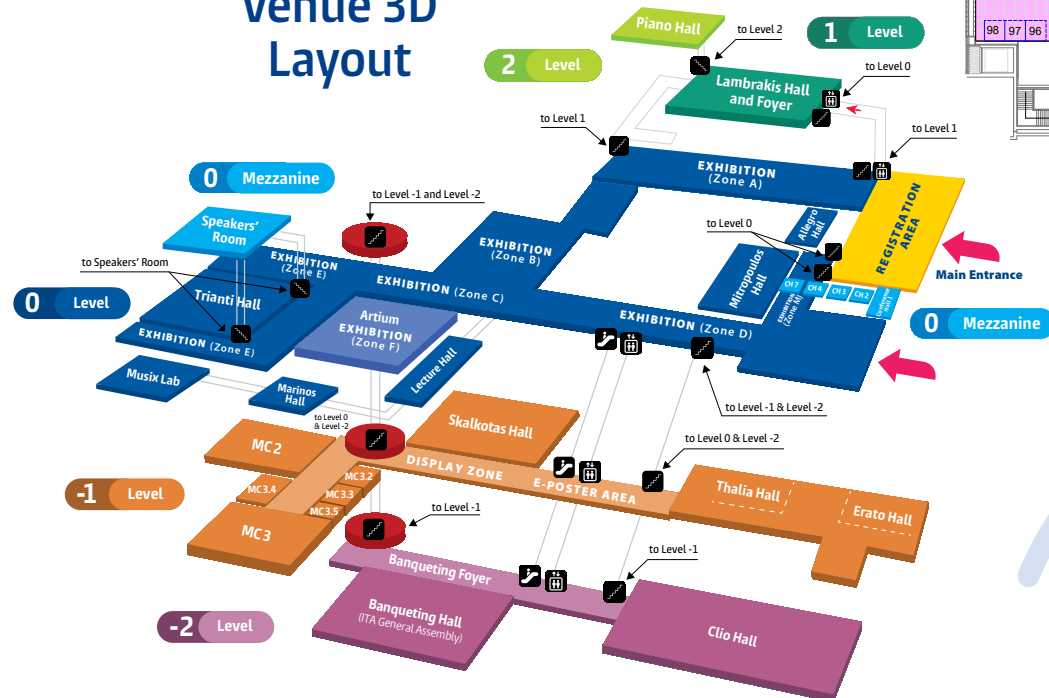
Megaron Athens International Congress Centre (MAICC)

[www.wtc2023.gr](http://www.wtc2023.gr)

## Exhibition Floor Plan



## Venue 3D Layout



## Exhibition Zones Color code



# EXHIBITION

## Exhibitors List

(Zone/Alphabetical order)



COMPANY	Sponsorship Type	Booth No.	Zone
<b>Sponsors - Indoor Space</b>			
Attiko Metro	Silver Sponsor	6	A
AVAX S.A.	Silver Sponsor	12	A
BarChip Inc.	Exhibitor	21+23	A
China Railway Construction Heavy Industry Co.Ltd (CRCHI)	Gold Sponsor	14+16	A
Danish Society for Tunnels and Underground Works	Exhibitor	A3	A
GETECH Srl. - Gennaretti	Exhibitor	25	A
IoT Automation	Silver Sponsor	11	A
LAVIOSA CHIMICA MINERARIA SpA	Exhibitor	26-27	A
ÖSTU-STETTIN Hoch- und Tiefbau GmbH	Gold Sponsor	7+9	A
Penetron	Gold Sponsor	8+10	A
Pini Group	Exhibitor	19	A
STRATA Worldwide   Tunnelling	Exhibitor	24	A
Tianjin Wirelink International Trade Co. Ltd	Gold Sponsor	2+4	A
Titan	Silver Sponsor	5	A
Trimble	Silver Sponsor	15	A
TTC Technical Tunneling Componets	Exhibitor	28	A
WORLD SENSING	Exhibitor	18	A
WTC 2024 - Guangdong Shuangwei Culture Technology Group Co. LTD	Exhibitor	A1	A
WTC 2025 - Swedish Rock Engineering Association	Exhibitor	A2	A
Zitron	Silver Sponsor	17	A
Zollern GmbH& Co.KG	Exhibitor	20+22	A
BABENG BabEng GmbH	Exhibitor	47	B
CP Technology	Exhibitor	31-32	B
Devico A.S.	Exhibitor	45	B
Digitalnology	Exhibitor	29	B
E-BERK Tunnel & Foundation Technologies	Exhibitor	48	B
EGCRETE	Exhibitor	38	B
Infranea Nederland	Exhibitor	33	B
MAT HELLAS	Exhibitor	40	B
Norwegian Tunnelling Society	Exhibitor	43-44	B
Pinssar	Exhibitor	41	B
SEALABLE SOLUTIONS	Exhibitor	42	B
Strukton Immersion Projects bv / Strukton Europe	Exhibitor	35+ 36	B
Taylor & Francis	N/A	37	B
TBM TECHNOLOGY	Exhibitor	30	B
TERRATEC	Exhibitor	46	B
Tunnel waterproofing	Exhibitor	39	B
WUERTH	Exhibitor	34	B
Zitron	Silver Sponsor	17	B

COMPANY	Sponsorship Type	Booth No.	Zone
<b>Sponsors - Indoor Space</b>			
ARCELORMITTAL Fibres	Gold Sponsor	49-50	C
BEKAERT	Silver Sponsor	76-77	C
CREG TBM Germany GmbH	Gold Sponsor	72-73	C
HERRENKNECHT AG	Silver Sponsor	51-52-53-54	C
Japan Tunnelling Association	Exhibitor	57	C
MAPEI SpA UTT-Underground Technology Team Intl.	Platinum	60-61-62-63	C
Master Builders Solutions Deutschland GmbH	Silver Sponsor	68-69-70-71	C
Mayr Power Transmission	Exhibitor	58	C
NORDIA - CHRYSO	Silver Sponsor	55	C
Normet Group Oy	Gold Sponsor	79-80	C
ROBBINS COMPANY	Exhibitor	59	C
Sandvik Mining & Rock Solutions + DSI Underground	Silver Sponsor	78+81	C
SIKA AG	Gold Sponsor	74-75	C
Socotec	Platinum	64-65-66-67	C
VA SYD - Maxima	Exhibitor	56	C
ARSAN KAUCUK	Exhibitor	94	D
BENTLEY SYSTEMS	Silver Sponsor	87	D
Deep Excavation	Exhibitor	L2	D
FAMA	Exhibitor	83	D
FISHER	Exhibitor	L6	D
F. WILLICH GmbH - Co. KG	Exhibitor	93	D
GEEG Srl	Exhibitor	92	D
KORDSA	Exhibitor	95	D
MAPLAD	Exhibitor	L7	D
Mighty Shields Industries	Exhibitor	88	D
Mim muhendislik	Exhibitor	91	D
Mobbot	Exhibitor	90	D
Promat, Etex Group	Exhibitor	84+86	D
Purin	Exhibitor	109	D
Rocsience	Exhibitor	L1	D
ROXARD	Exhibitor	82	D
Seequent	Silver Sponsor	85	D
Trelleborg Ridderkerk BV.	Exhibitor	L3	D
Turnkey Intruments Ltd	Exhibitor	L4	D
WTC 2026 Montreal Candidate City	Exhibitor	L5	D
AMBERG GROUP	Exhibitor	100-101	E
ARCO SRL	Exhibitor	111	E
ELIN Motoren GmbH	Exhibitor	103	E
Elkuch Group	Exhibitor	107	E
GEODATA Surveying & Monitoring Group	Exhibitor	102	E
HODAPP GmbH & Co. KG	Exhibitor	99	E
PERI Hellas Ltd	Exhibitor	110	E
Pps-poltinger Precision Systems GmbH.	Exhibitor	104	E
Schöller special machines GmbH & Co. K	Exhibitor	106	E

COMPANY	Sponsorship Type	Booth No.	Zone
<b>Sponsors - Indoor Space</b>			
Siteco GmbH	Exhibitor	108	E
Tradecc	Exhibitor	105	E
Webac	Exhibitor	112	E
ADCOS - International & ADCOS - International Asia	Exhibitor	M1	M
Foresight	Exhibitor	M6	M
IWI - AS Hellas	Exhibitor	M7	M
NHAZCA	Exhibitor	M5	M
Systra	Exhibitor	M4	M
TRE ALTAMIRA	Exhibitor	M2+M3	M

<b>Sponsors Outdoor (tent)</b>			
AB Tunelling	Exhibitor	125	F
ADFIL Construction Fibres	Exhibitor	139	F
Village France of AFTES	Exhibitor	117-118-123-124	F
CDM SMITH	Exhibitor	127	F
CFT GmbH - Compact Filter Technic	Exhibitor	140+138	F
China Railway Tunnel Group Co., Ltd	Exhibitor	119	F
Niras	Exhibitor	130	F
NLT Digital Solutions.	Exhibitor	120	F
Olivibra	Exhibitor	131	F
O-Pitblast S.A.	Exhibitor	134+128	F
Pretec	Exhibitor	116	F
PROTAN AS - Tunnelling & Mining	Exhibitor	115+121	F
See telecom	Exhibitor	L8	F
Schauenburg Maschinen und Anlagen-Bau GmbH	Exhibitor	135	F
Soprema Italy	Silver Sponsor	126	F
STM Group	Exhibitor	132	F
Telt	Exhibitor	122	F
Tsakas	Silver Sponsor	113-114	F
TRAKKOM Engineering & Industries	Exhibitor	133+137	F
Yunex Traffic	Silver Sponsor	136+L9	F
VMT GmbH	Exhibitor	129	F

<b>Sponsors in Display Zone (Skalkotas Hall)</b>			
Australasian Tunnelling Conference	Exhibitor	S1	Display
Baumhueter	Exhibitor	S5	Display
Codel International Ltd	Exhibitor	S2	Display
ELEBOR S.A.	Exhibitor	S9	Display
Ermaks Engineering	Exhibitor	S7	Display
Grydale	Exhibitor	S3	Display
Precision Drawell	Exhibitor	S12	Display
Sika Services	Exhibitor	S4	Display
Technogenia	Exhibitor	S6	Display
Thrace Plastic	Exhibitor	S8	Display

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# Acknowledgements



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ΠΕΡΙΦΕΡΕΙΑ ΑΤΤΙΚΗΣ



HELLENIC REPUBLIC  
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## TECHNICAL CHAMBER OF GREECE & ASSOCIATIONS



## GREEK TECHNICAL UNIVERSITIES



National Technical  
University of Athens



ARISTOTLE  
UNIVERSITY OF  
THESSALONIKI



ΔΗΜΟΚΡΙΤΕΙΟ  
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steel fiber series

Tianjin Heng Feng Xu Xiang Metal New Materials Inc (HF Metal) , is the largest steel fiber manufacturer in China, annual producing capacity is 55,000 tons. Products are with CE/KS/ISO9001 certificated.

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- Diameter: 0.4-1.0 mm
- Length: 25-60mm
- Tensile Strength: 1100- 2400 mpa
- Galvanized & Stainless Wires available

Micro Steel fibers Series

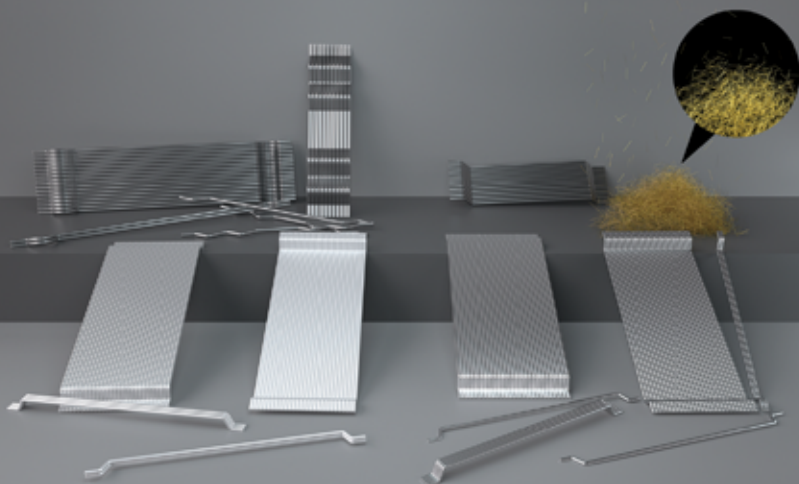
- Diameter: 0.12-0.3mm
- Length: 6-20mm
- Tensile Strength: 2800+ MPa
- Brass Coated & Stainless Wires available

Website: [www.hf-steelfiber.com](http://www.hf-steelfiber.com)

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# CRCHI

## Who Are We

Founded in 2007, China Railway Construction Heavy Industry Corporation Limited (CRCHI) is a member of China Railway Construction Corporation Limited (CRCC). In 2022, CRCC is ranked No.39 of Global Fortune 500. We are a large professional enterprise focusing on the research, design, manufacture, and service of underground engineering equipment and rail transit system.



## What Do We Do

CRCHI has been focusing on design, and manufacture of non-standardized, customized high-end equipment. It has created three mature industrial sections, which are rail track system, tunnel boring machine and drilling & blasting equipment, and in recent years stepped into new industry sections such as new rail transit system, agricultural machine, green building materials construction equipment, mining construction equipment, new construction materials etc. The company is a total solution provider for intelligent cluster systems of underground engineering equipment.

## Our Mission

CRCHI is committed to becoming the world's leading underground engineering equipment and rail transit system provider. Based on the know-how, expertise and experience, CRCHI is at the forefront to promote the effectiveness and quality of underground construction, to reduce the cost and minimize the impact to environment and in the end to make our society and the world better, smarter and more sustainable.



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CREG TBM Germany is a subsidiary of China Railway Engineering Equipment Group Co., Ltd., a global leader in the design and manufacture of railway construction and maintenance equipment.



◀ Project Paris Line 16 Lot 2

CREG was established in 2014 in Düsseldorf as a result of the acquisition of the tunnel boring business from the esteemed tunnel boring machine manufacturer Aker Wirth. The company specializes in manufacturing tunnel boring machines (TBMs) that have been utilized in diverse applications such as constructing metro, railway, and highway tunnels, water transfer tunnels, and sewage tunnels. Notably, CREG's TBMs have been employed in challenging terrains, including mountainous areas with high ground pressure and tunnels beneath rivers with high water pressure.

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Email: [info@creg-germany.com](mailto:info@creg-germany.com)  
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# Notes



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