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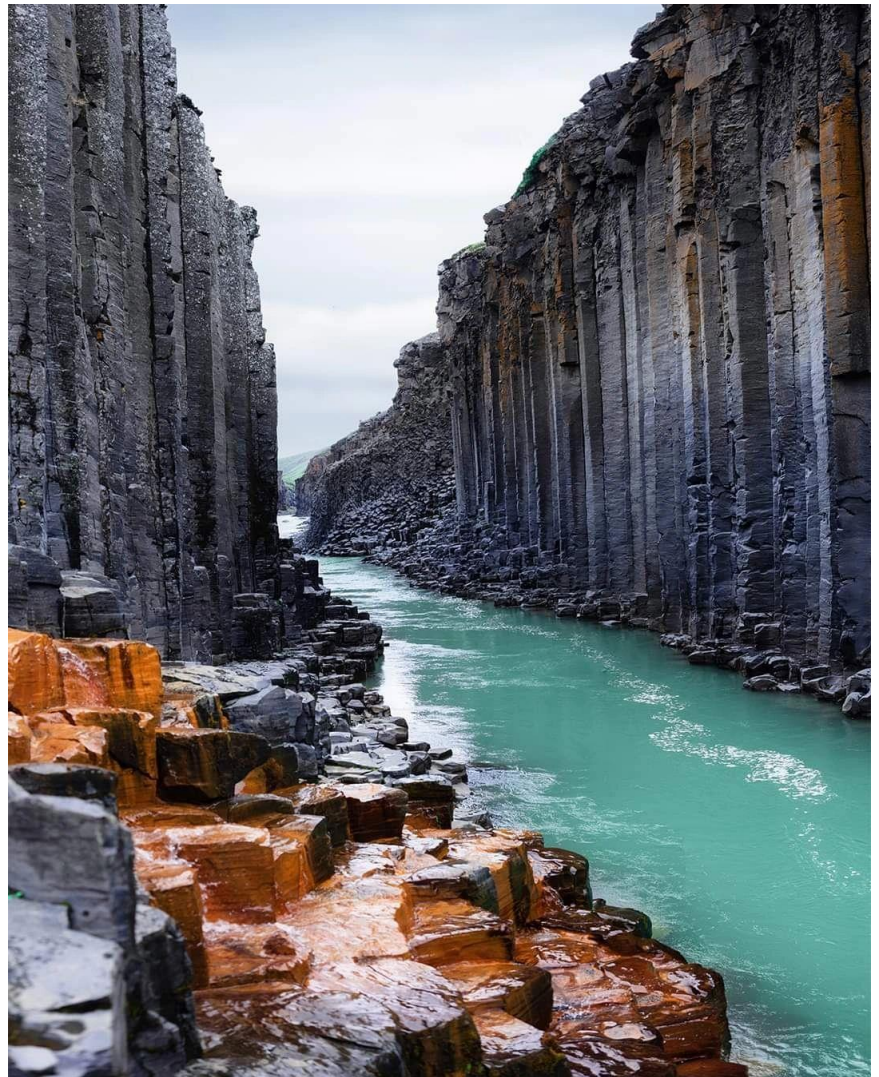
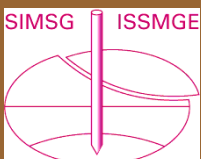


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ΕΔΑΦΟΜΗΧΑΝΙΚΗΣ  
& ΓΕΩΤΕΧΝΙΚΗΣ  
ΜΗΧΑΝΙΚΗΣ

# Τα Νέα της Ε Ε Ε Ε Γ Μ

191

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## Post-disaster engineering geological assessment of the 2024 Noto Earthquake, Noto Peninsula, Japan

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A team from the Nepal Society of Engineering Geology (NSEG), the Japan Society of Engineering Geology (JSEG), and YON-C Consultants Co., Inc. of Takamatsu, Kagawa, Japan visited the earthquake-affected area of the Noto Peninsula, Japan, from August 3 to 5, 2024. A brief understanding of the assessment is included in the report.



The Author Team: From left to right: Prof. Dr. Shuichi Hasegawa, Ms. Anjila Babu Malla, Ms. Sweta Guragain, Mr. Ashis Acharya, Dr. Ranjan Kumar Dahal

### Introduction

On January 1, 2024, as the people of the Noto Peninsula were celebrating the New Year, a sudden and powerful earthquake, with an epicentre at a depth of 16 km, resulted in 299 confirmed deaths and three people still missing (NHK, 2024). Fig. 1 shows the tectonic setting around Japan and the location of the Noto earthquake's epicentre. The intense seismic activity caused significant crustal deformation and triggered cascading hazards throughout the region. This unusual event, characterised by an active seismic swarm and unexpectedly strong ground shaking, has been linked to the accumulation of underground fluids due to a reverse fault stress field, as suggested by the focal mechanism analysis (Ishikawa and Bai, 2024). The cracks in the earth's crust were oriented horizontally as the fluids flowing underground in deep areas could not rise and spread over a wide area in the horizontal plane.

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Two factors made this earthquake unusual: (a) an active seismic swarm resulting from the upward migration of crustal fluids and (b) much larger shaking than expected for an earthquake of its size and depth (Toda and Stein, 2024). The major earthquake and subsequent tremors caused several engineering geological issues, including land uplift, structural collapse due to soil liquefaction, tunnel collapses, and landslides. These impacts are discussed in detail in the report available (Suppasri et al., 2024). Although many studies are ongoing, no reports or published papers address the affected area's post-disaster conditions. We conducted a joint field excursion eight months after the main shocks in Ishikawa Prefecture to observe the post-disaster conditions and assess the progress of repairs on these engineering geological challenges.

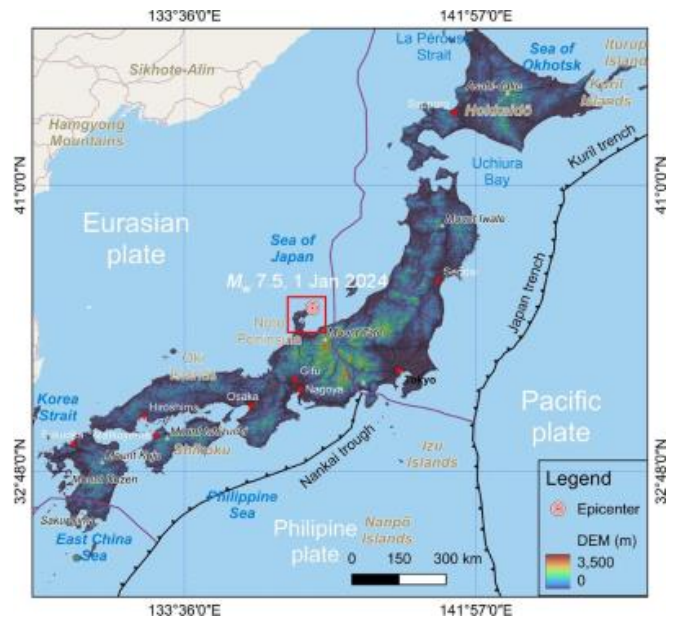


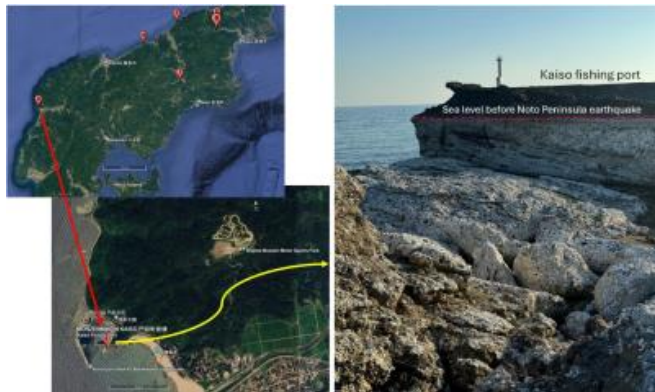
Fig. 1 Tectonic setting in and around Japan

### Soil liquefaction, subsidence and upliftment

The 2024 Noto earthquake triggered widespread liquefaction, leading to extensive damage across the affected areas. Our observations indicate that most of the structural damage resulted from the liquefaction of deeper sandy strata. Liquefaction typically occurs when seismic vibrations disturb loosely packed, saturated fine sand to silt sediments near the surface, causing a significant loss of ground strength. For example, during the 2011 Great East Japan Earthquake, liquefaction was observed in reclaimed lands and old river channels (The Japan Times, 2024). However, in the case of the Noto earthquake, liquefaction occurred in areas where sand deposits and sand dunes had accumulated, particularly on the landward side, making the land more susceptible to subsidence and dry slope failure. This phenomenon was especially damaging in Uchinada town, where approximately 1,590 homes were reported to have been affected (The Asahi Shimbun, 2024).

Since December 2020, a seismic swarm began in the Noto Peninsula, initially confined to a small area associated with upwelling fluids through a shallow fault zone at a depth of around 16 km (Nishimura et al., 2023). This activity escalated significantly with a magnitude 6.5 earthquake in 2023, linked to the same mechanism (Kato, 2024). Our observations show that the seafloor in the western part of Wajima City has been uplifted by approximately 4 meters (see Fig. 2). This uplift was also confirmed by 2.5D analysis, pixel offset analysis, and SAR interferometry analysis conducted by the Geospatial Information Authority of Japan using ALOS-2 data (Geospatial Information Authority of Japan, 2024). The

presence of wave-cut terraces and cliffs further evidences the extent of coastal uplift. Additionally, sea organisms such as oysters, bivalves, gastropods, and shellfish that were attached to the seawall and uplifted clearly indicate the pre-earthquake sea level, which can be significantly observed at the Kaiso fishing port.

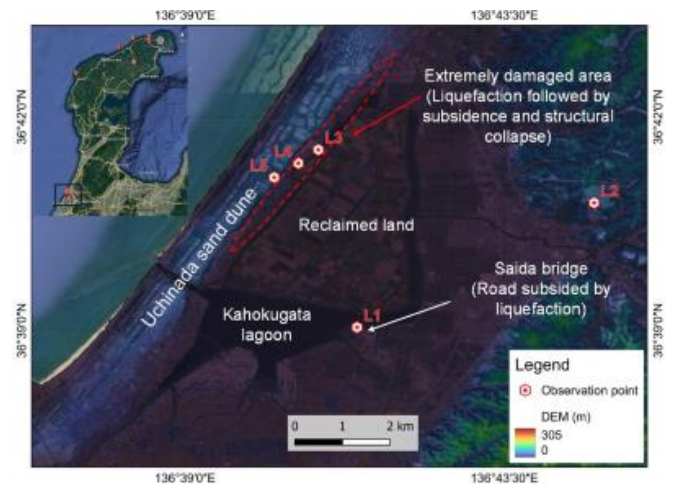


**Fig. 2** Kaiso fishing port uplifted by the Noto Peninsula Earthquake<sup>4</sup>

Approximately 2 m of land was uplifted in the northern part of Suzu City due to reverse faulting, which also caused the uplift of the Wakayama River bed, resulting in the damming of the river, now preserved as a pond. This event is part of a series of surface deformations (active faults) distributed along the Wakayama River, crossing its meandering path. At the observation point, the road runs perpendicular to the fault. In Uchinada Town, the Saida Bridge has collapsed (Fig. 3) due to ground subsidence, disrupting the connection between the structure and the ground. The area, a floodplain located at the neck of Kahokugata Lagoon, has experienced significant subsidence due to sand liquefaction. Traffic on this bridge has been completely halted since the event. Lateral stress caused the bridge's northern side to pop up, displacing the abutment with a 36 cm lateral crack toward the south and a vertical movement of 12 cm, leading to the buckling of the bridge's middle section, which remains visible today. Fig. 4 also shows the structural collapse associated with the liquefaction. Additionally, Mizuno et al. (2024) also reported the damage to the twin bridge (Naka-Noto Agriculture Bridge and Noto Island Ohashi Bridge) that connects Noto Island and the peninsula.



**Fig. 3** Damages in the Saida bridge, Uchinada



**Fig. 4** Liquefaction related engineering issues observed along the coast of Saidamachi, Iwasaki, and Midorigaoka (L1 to L5 represents the observation site location)

### Earthquake-induced landslides

The 2024 Noto earthquake triggered numerous landslides, some of which were examined during field visits across the study area (Fig. 5). Emergency aerial images from January 2, 2024, revealed approximately 930 co-seismic landslides in mountainous and coastal regions, with a mean area of 5,353 m<sup>2</sup> and the largest one covering 373,962 m<sup>2</sup> (Gomez, 2024). In total, the Noto earthquake caused over 2,300 landslides across a large area, comparable to the Mid-Niigata Prefecture earthquake in 2002, which caused more than 5,000 landslides, and the Hokkaido Iburi earthquake in 2018, which triggered 6,000 landslides (Loi et al., 2024).

Earthquake-induced landslides can be categorised into several types, including rock falls, shallow landslides and dry debris flows, deep-seated landslides, and cut-fill slope failures, as described by Dahal (2015). Deep-seated landslides, such as deep-seated gravitational slope deformation (DGSD) and shallow slope failures, are primarily triggered by strong ground shaking. In the study area of Wajima City, we observed numerous deep characterised by subsidence and the spreading of the upper part of a rock slope, along with outward movement or bulging at the slope's base. These landslides have also blocked the highway, necessitating the construction of alternative transportation routes. In Tsubata, Kahoku District, a significant landslide displaced a large mass of earth, exposing the foundations of houses and increasing their vulnerability. To mitigate further damage, plastic sheeting has been applied to the exposed land to prevent rainfall infiltration, thereby reducing the risk of additional movement or collapse. Areas prone to landslides face a high risk of secondary disasters due to future rainfall on unstable sediment and driftwood accumulated on slopes and in mountain streams. Consequently, the government actively implements emergency landslide countermeasures in these high-risk areas.

Cut and fill slope failures are also serious engineering concerns in the affected regions. Many roadside slopes in mountainous areas have suffered from these failures, primarily due to improper excavation practices and the instability of placed or filled material on the slopes.

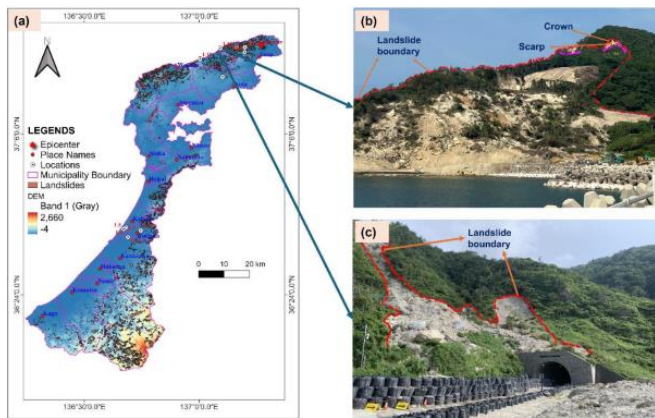
### Structural collapses

#### Tunnel collapse

After the Noto earthquake, the landslide in the Utsuyama area impacted the stability of the Otani tunnel, leading to the tunnel liner spalling (Fig. 6). The spalled lining materials have been mocked out of the tunnel and kept in the roadside. The



landslide caused the ground to slip laterally around 40 cm on the road and the Otani loop bridge (Fig 6d). The route between Suzu City and Otani-Cho remains closed due to the tunnel collapse, even eight months after the disaster. Similarly, the Osaka Tunnel on the northwest side of Mauramachi has been entirely covered by landslide debris and slope failure, rendering the tunnel entrance unrecognisable to this day.



**Fig. 5** (a) Landslide distribution map along the Noto Peninsula; (b) large landslide mass covering the Osaka tunnel entrance; and (c) tunnel damaged by the landslide mass (the photograph was taken from the location with coordinate 37° 27' 57.2" N and 137° 05' 11.0" E)



**Fig. 6** (a) Tunnel damaged by the sliding mass; (b) schematic diagram of liner spalling; (c) concrete liner mocked out from the tunnel; and (d) lateral slip observed along the roadside near the tunnel entrance (photographs coordinate location: 37° 28' 40.6416" N and 137° 11' 58.7292" E)

### Building collapse

We conducted a field survey of damaged wooden houses along the Noto Peninsula coast on August 3-4, 2024. According to the updated damage information published on August 21 by the official website of Ishikawa Prefecture, there were 5,190 completely damaged buildings, 16,231 partially destroyed houses, and 60,426 buildings with partial damage within the prefecture Prevention, Safety and Security, Ishikawa Prefecture, 2024). Most of the houses are characterized by wooden mud walls and black roof tiles. We visually observed the extent of damage, ranging from minor to severe, and found that traditional timber-framed two-story houses suffered the most significant damage during the earthquake. In particular, the Wajima and Suzu areas had many houses either completely destroyed or severely tilted (deformed) (Fig. 7a and b). Many roofs were covered with plastic sheeting provided by local authorities. We also observed building

inspection certificates affixed to the outer walls of the inspected structures (Fig. 7c and d).

Residents have been moved to temporary housing, and little progress in infrastructure repair was noted. Our survey underscored the inadequacy of current seismic performance assessments for buildings in Japan. We strongly advocate for enhanced construction of earthquake-resistant buildings and retrofitting of existing structures, which was also emphasised by Suppasri et al. (2024).



**Fig. 7** (a) Completely collapsed building; (b) tilted building; (c) building inspection certificate; and (d) inspection certificate attached to a building suffered with uplift and subsidence.

### Lesson learned and conclusion

Eight months have passed since the 2024 Noto Peninsula earthquake struck at the time of New Year. This field survey evaluates the damage and engineering geological challenges resulting from the earthquake. The severe tremors caused significant issues, including land uplift, structural collapses from soil liquefaction, tunnel failures, and landslides. Our findings highlight that the mountainous terrain of the Noto Peninsula is particularly vulnerable to slope failures, emphasizing the need for thorough geological assessments and reinforcement in similar areas to reduce landslide risks. Liquefaction and land subsidence were the major engineering concerns, causing severe damage to both human settlements and infrastructure, especially in rural areas. Notably, cut-and-fill slopes along mountainous roads were extensively damaged, indicating a need for seismic-resistant road design. Traditional wooden houses also sustained substantial damage, underscoring the importance of enhancing their seismic resistance and preparing for potential collapses, not only in the affected area but across Japan. Overall, Ishikawa Prefecture is focused on recovery and rebuilding from the 2024 Noto earthquake. For future resilience, it's crucial to address the engineering challenges revealed by the disaster and ensure that infrastructure and buildings are designed to withstand future seismic events.

### Acknowledgments

We extend our deepest gratitude to the Japan Society for the Promotion of Science (JSPS) for awarding the JSPS BRIDGE

Fellowship to Dr. Ranjan Kumar Dahal, which has enabled this invaluable collaborative research program. We also wish to express our sincere appreciation to the staff of YON-C Consultants Co., Inc., Takamatsu, Kagawa Prefecture, for their unwavering support and active participation in our field investigations.

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# ΝΕΑ ΑΠΟ ΤΙΣ ΕΛΛΗΝΙΚΕΣ ΚΑΙ ΔΙΕΘΝΕΙΣ ΓΕΩΤΕΧΝΙΚΕΣ ΕΝΩΣΕΙΣ



ΕΛΛΗΝΙΚΗ  
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ΕΤΑΙΡΕΙΑ  
ΕΔΑΦΟΜΗΧΑΝΙΚΗΣ  
& ΓΕΩΤΕΧΝΙΚΗΣ  
ΜΗΧΑΝΙΚΗΣ

## 15η Αθηναϊκή Διάλεξη Γεωτεχνικής Μηχανικής

Η 15η Αθηναϊκή Διάλεξη Γεωτεχνικής Μηχανικής θα δοθεί από τον

**R. Kerry Rowe OC, NAE, FEng, FRS**  
Distinguished University Professor  
Queen's University, Kingston, Canada,

με τίτλο

### Some challenges with old and new dams

την Πέμπτη 24 Οκτωβρίου 2024, ώρα 6:30μμ.

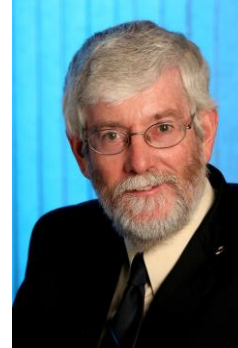
### Περίληψη Διάλεξης

There was a huge increase in dam construction post World War II in many countries. Most of those dams were built 50 to 80 years ago and like us, they age. Dams are forgotten infrastructure - until they fail. Superimposed on ageing is climate change with huge changes having occurred over the last decade as evidenced by increased flooding and the original inflow design flood being exceeded. May 2024 is memorable for the failure of dams in Brazil and Kenya during extreme rainfall events. These failures caused huge flooding and loss of life. September 2023 is memorable for the loss of about 5000 lives with the collapse of Derna's two dams in Libya during an extreme rainfall event. These examples and many more are a stark reminder of what happens when we do not pay enough attention to the issue. This talk will discuss the issues contributing to these failures and the means of achieving the rehabilitation of several dams with which the speaker has been involved where remediation measures have ranged from lining and grouting, raising the crest, adding berms, and increasing spillway capacity to a complete reconstruction. The significance of different soil foundations is discussed together with some of the current challenges such as filter blocking, joints eroding, and homogeneous old dams. All of this is at a time when hydroelectric power is increasingly needed. He will illustrate that building new dams is also a challenge and use a large dam nearing completion as an example. The role of geosynthetics concerning dams and their history is also touched upon.

### Σύντομο Βιογραφικό Σημείωμα Ομιλητού

Professor R. Kerry Rowe spent his formative years living in a construction town in Australia during the construction Snowy Mountains hydroelectric scheme in the 1950s and early 1960's. Inspired to build dams he went on to study at the University of Sydney in Australia. He was awarded a BSc (Computer Science & Mathematics) in 1973, B.E. (Hons I, Civil Engineering) and the University Medal in 1975, a Ph.D. in 1979, and D.Eng in 1993. From 1971 to 1974 he was a

cadet engineer and from 1975 to 1978 a geotechnical engineer with the Commonwealth of Australia Department of Construction. Dr. Rowe then spent 21 years (1979-2000) as a professor at the University of Western Ontario, Canada. From 2000-2010 he served as Vice-Principal (Research) at Queen's University in Kingston, Canada. He is presently the Distinguished University Professor (2019-) and the Canada Research Chair in Geotechnical and Geoenvironmental Engineering (2010-) in the Department of Civil Engineering at Queen's University.



Professor Rowe's research and consulting have been in contaminant hydrogeology, the integration of hydrogeology and civil engineering in landfill design, containment of contaminated sites, geosynthetics (including geotextiles, geomembranes, geogrids, geonets, etc.), tailings storage facilities, heap leach pads, hydro and tailings dams, reinforced embankments and walls, tunnels in soft ground, failure of slopes and excavations, and foundations in weak rock.

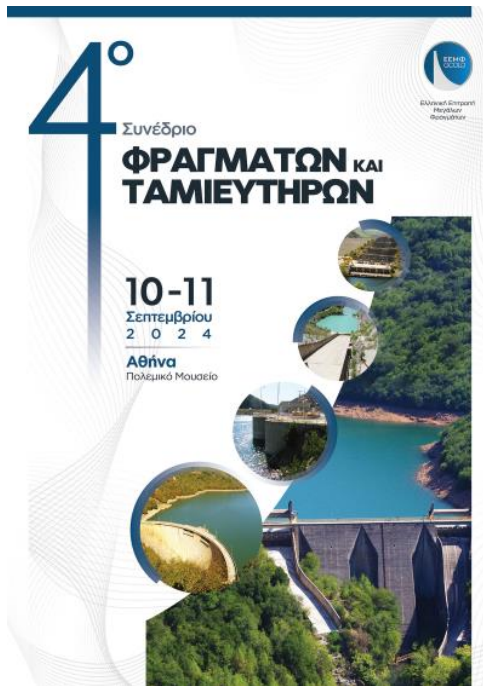
He has consulted on over 190 projects worldwide in geographic locations ranging from the Arctic to the Antarctic. He has an h-index of 87 (Google) and over 30,000 citations. His numerous awards include IGS Gold Medal in 1996, 2004, 2014, 2018, and 2022, Thomas Telford Gold Medal, Western University's top Teaching Award, the Ontario Excellence in Teaching Award, the Queen's University Award for Excellence in Graduate Student Supervision. His distinguished lectures include the Giroud Lecture (2002), Rankine Lecture (2005), Manuel Rocha Lecture (2006), Casagrande Lecture (2011), Karl Terzaghi Lecture (2017), and Mercer lecture (2019). In 2013, the International Society for Soil Mechanics and Geotechnical Engineering created the R. Kerry Rowe Lecture to honour his seminal contributions to the development of geoenvironmental engineering. In 2021, the International Geosynthetics Society created the Kerry Rowe Lecture to honour his seminal contributions to geosynthetic engineering. He has been elected a Fellow Royal Society (2013), a Foreign Member of the U.S. National Academy of Engineering (2016), a fellow UK Royal Academy of Engineering (2010), and both the Royal Society of Canada (2001) and the Canadian Academy of Engineering (2001). In 2020, he was elected a Distinguished Member American Society of Civil Engineers and was recently the second Canadian academic to be elected to the US National Academy of Construction. He was appointed an Officer of the Order of Canada in 2018 and in 2022 he was the inaugural winner of the NSERC Donna Strickland Prize for the Societal Impact his research has had on environmental protection.



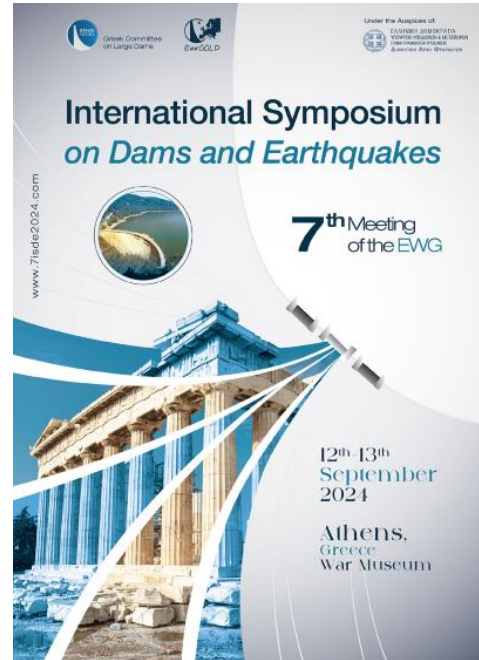
ΕΛΛΗΝΙΚΗ ΕΠΙΤΡΟΠΗ ΜΕΓΑΛΩΝ ΦΡΑΓΜΑΤΩΝ  
4<sup>ο</sup> Συνέδριο Φραγμάτων και Ταμιευτήρων



Το διήμερο 11 και 12 Σεπτεμβρίου διεξήχθη στο Πολεμικό Μουσείο το 4<sup>ο</sup> Συνέδριο Φραγμάτων και Ταμιευτήρων με σημαντική συμμετοχή συνέδρων, ιδιαίτερα πολύ νέων συναδέλφων.



Η Ελληνική Επιτροπή Μεγάλων Φραγμάτων, σε συνεργασία με το European Working Group on Dams and Earthquakes του European ICOLD Club της International Committee on Large Dams διοργάνωσαν το International Symposium on Dams and Earthquakes στα πλαίσια του 7<sup>th</sup> Meeting of the EWG.



#### ΘΕΜΑΤΟΛΟΓΙΑ ΣΥΝΕΔΡΙΟΥ

- Ενέργεια / Αντλιοσταμείωση και Φράγματα
- Κοινωνικά Θέματα / Ενημέρωση / Δημόσια Εικόνα των Φραγμάτων
- Καινοτομίες στο Σχεδιασμό, την Κατασκευή και την Παρακολούθηση Φραγμάτων
- Αναβάθμιση Φραγμάτων: Ασφάλεια / Απόδοση
- Λειτουργία / Συντήρηση και Διαχείριση Κρίσεων
- Διαχείριση Υδάτινων Πόρων / Υδρολογία & Κλιματική Αλλαγή
- Διαχείριση Ταμιευτήρων / Πλημμυρών / Φερτών Υλών
- Περιβαλλοντικός Σχεδιασμός Φραγμάτων / Οικο-Υδρολογία & Οικο-Υδραυλική

Τα πρακτικά του συνεδρίου θα αναρτηθούν στον ιστότοπο της ΕΕΜΦ (<https://eemf.gr>).

#### THEMES

- Earthquake hazard parameters (e.g., ground motion, surface fault movements) for dam safety evaluation
- Measurement of seismic and post-seismic response of concrete and embankment/tailings dams
- Experimental behavior and modeling of dam materials under cyclic loading
- Seismic performance of concrete dams and their impacted area.
- Case histories, analysis & validation, design
- Seismic performance of embankment/tailings dams and their impacted area.
- Case histories, analysis & validation, design
- Earthquake safety evaluation of safety-critical dam elements (e.g. spillways, low-level outlets)

#### THEMATIC SESSIONS

- Session 1 Selection of Ground Motions - Seismic Actions in new Eurocode 8
- Session 2 Observed Performance of Embankment Dams and Slopes During
- Strong Earthquakes
- Session 3 Seismic Analysis and Safety Evaluation of Embankment Dams - Part I
- Session 4 Seismic Analysis and Safety Evaluation of Gravity Dams
- Session 5 Seismic Analysis and Safety Evaluation of Embankment Dams - Part II

Τα πρακτικά του συνεδρίου θα αναρτηθούν στον ιστότοπο της ΕΕΜΦ (<https://eemf.gr>).



**ΕΛΛΗΝΙΚΗ ΕΠΙΤΡΟΠΗ ΜΕΓΑΛΩΝ ΦΡΑΓΜΑΤΩΝ**  
**European ICOLD Club**

**International Symposium on Dams and Earthquakes**







## ΕΛΛΗΝΙΚΗ ΕΠΙΤΡΟΠΗ ΣΗΡΑΓΓΩΝ και ΥΠΟΓΕΙΩΝ ΕΡΓΩΝ (Ε.Ε.Σ.Υ.Ε.)

### Γενική Συνέλευση και Εκλογές

Προς: Σώμα Εκλεκτόρων ΕΕΣΥΕ

Αθήνα, 27 Σεπτεμβρίου 2024

**Θέμα:** Πρόσκληση σε Γενική Συνέλευση και Εκλογές ΕΕΣΥΕ 2024

- Σχετικά:**
- Η από 24-05-2024 επιστολή της Εξελεγκτικής-Εφορευτικής Επιτροπής (ΕΕΕ) προς το Σώμα Εκλεκτόρων περί διενέργειας Εκλογών ΕΕΣΥΕ
  - Η από 26-08-2024 επιστολή της Εξελεγκτικής-Εφορευτικής Επιτροπής (ΕΕΕ) προς το Σώμα Εκλεκτόρων περί παράτασης υποβολής υποψηφιοτήτων
  - Η από 16-09-2024 επιστολή της Εξελεγκτικής-Εφορευτικής Επιτροπής (ΕΕΕ) προς το ΔΣ με πρόταση περί της διεξαγωγής της εκλογικής διαδικασίας

Με απόφαση του Δ.Σ. της Ε.Ε.Σ.Υ.Ε. (έχοντας υπόψη τα άρθρα 5, 6 και 7 του Καταστατικού) και σε συνέχεια των σχετικών επιστολών, καλείται το Σώμα Εκλεκτόρων σε Γενική-Εκλογική Συνέλευση με τα παρακάτω θέματα:

- Διοικητικός απολογισμός του απερχόμενου Δ.Σ.
- Οικονομικός απολογισμός του απερχόμενου Δ.Σ.
- Εκλογές για την ανάδειξη νέου Δ.Σ. και νέας Εξελεγκτικής-Εφορευτικής Επιτροπής

Η Γενική Συνέλευση θα πραγματοποιηθεί σε ανοικτό χώρο στην ταράτσα του καφέ **MS Roof Garden στην οδό Αθηνάς 1 και Ερμού (είσοδος από τη στοά δίπλα στον Σιδηροδρομικό Σταθμό στο Μοναστηράκι)** την Τρίτη 29 Οκτωβρίου 2024 και ώρα 18:00. Σε περίπτωση μη απαρτίας η Συνέλευση θα πραγματοποιηθεί, ανεξάρτητα από τον αριθμό των παρευρισκόμενων μελών, στον ίδιο χώρο την Τετάρτη 30 Οκτωβρίου 2024 και ώρα 18:00.

Οι υποψηφιότητες, όπως διαμορφώθηκαν μετά την υποβολή προτάσεων στη σχετική πρόσκληση, έχουν ως εξής (με αλφαβητική σειρά):

Για το Δ.Σ. της ΕΕΣΥΕ:

- Αλιφραγκής Δημήτριος (Πολ. Μηχ. - ΕΛΛΗΝΙΚΟ ΜΕΤΡΟ)
- Γεωργίου Δημήτριος του Χαραλ. (Μετ. Μηχ. - ΑΤΕΝΕΙΑ)
- Μαρίνος Βασίλειος (Πολ. Μηχ. - Επικ. Καθηγητής ΕΜΠ, Σχολή Πολ. Μηχ.)
- Μπαλάση Αιμιλία-Μαρία (Μαριλία) (Πολ. Μηχ. - Όμικρον Κάπα Μελετητική)
- Μπενάρδος Ανδρέας (Μετ. Μηχ. - Καθηγητής ΕΜΠ, Σχολή ΜΜΜ)
- Νομικός Παύλος (Μετ. & Πολ. Μηχ. - Καθηγητής ΕΜΠ, Σχολή ΜΜΜ)
- Παρασκευοπούλου Χρυσόθεμις (Μετ. Μηχ. - Επικ. Καθηγήτρια Πανεπιστήμιο Leeds)
- Ρούσσος Νικόλαος (Μετ. Μηχ. - Structures & Geotechnics)

Για την ΕΕΕ της ΕΕΣΥΕ

- Γιούτα-Μήτρα Παρασκευή (Μετ. Μηχ. - ΕΔΙΠ ΕΜΠ, Σχολή ΜΜΜ)
- Περγαντής Ευάγγελος (Πολ. Μηχ. - ΕΛΛΗΝΙΚΟ ΜΕΤΡΟ)
- Φίκιρης Ιωάννης (Πολ. Μηχ. - ΕΔΑΦΟΣ Σύμβουλοι Μηχανικοί)

Σύντομα βιογραφικά των υποψηφίων θα αναρτηθούν στην ιστοσελίδα της ΕΕΣΥΕ στην ενότητα ΝΕΑ έως τη Δευτέρα 30-9-2024.

Οι εκλογές όπως και κατά το έτος 2021 θα διεξαχθούν ως εξής:

Κάθε τακτικό μέλος και εκπρόσωπος «εταίρου-χορηγού» έχει τη δυνατότητα να ασκήσει το εκλογικό του δικαίωμα είτε στη Γ.Σ. είτε αποστέλλοντας εγκαίρως σε κλειστό φάκελο το ψηφοδέλτιό του (δικαίωμα μέχρι 7 σταυρούς για το Δ.Σ. και 3 για την Ε.Ε.Ε.). Το ψηφοδέλτιο αποστέλλεται συνημμένα στο παρόν και διατίθεται επίσης στην ιστοσελίδα της ΕΕΣΥΕ (στην ενότητα ΝΕΑ) προς εκτύπωση. Ο κλειστός φάκελος με το ψηφοδέλτιο (ΠΡΟΣΟΧΗ: ΧΩΡΙΣ ΑΝΑΓΡΑΦΗ ΚΑΝΕΝΟΣ ΣΤΟΙΧΕΙΟΥ), θα πρέπει να τοποθετηθεί σε μεγαλύτερο εξωτερικό φάκελο όπου και μόνο αναγράφεται το όνομα και η διεύθυνση του αποστολέα. Στο φάκελο αυτό θα πρέπει να περιληφθεί και απόδειξη ή φωτοτυπία του παραστατικού της καταβολής των οφειλών ή βεβαίωση του Ταμιά της ΕΕΣΥΕ (εγγραφή - συνδρομή και για το 2024), ώστε να είναι έγκυρη η άσκηση του εκλογικού του δικαιώματος. Η αποστολή της επιστολής να γίνει στα παρακάτω στοιχεία:

ΕΛΛΗΝΙΚΟ ΜΕΤΡΟ ΑΕ

Ταχ. Δ/νση: Λ. Μεσογείων 191-193, Τ.Κ. 115 25 Αθήνα  
Υπόψη κ.κ. Ε. Περγαντή ή Δ. Αλιφραγκή  
τηλ.: 210 6792263 ή 210 6792264

Κατά την ημέρα της εκλογικής διαδικασίας θα γίνει έλεγχος με βάση τις καταστάσεις καταχώρησης συνδρομών. Για την ενημέρωση του ποσού της οφειλής σας παρακαλούμε να επικοινωνήσετε με τον ταμιά της Ε.Ε.Σ.Υ.Ε. κ. Ευάγγελο Περγαντή, τηλ.: 210 6792263, email: [vpergantis@ametro.gr](mailto:vpergantis@ametro.gr).

Η καταβολή οφειλής δύναται να πραγματοποιηθεί στην ALPHA BANK Αρ. Λογ/σμού 364002002002090 στο όνομα Ε.Ε.Σ.Υ.Ε. (αρμόδιοι: Ιωάννης Φίκιρης και Ευάγγελος Περγαντής).

Εναλλακτικά μπορείτε να τακτοποιήσετε την οφειλή σας την ημέρα της Γ.Σ. προ της ψηφοφορίας.

Παράκληση όπως τα ψηφοδέλτια της δια αλληλογραφίας ψηφοφορίας αποσταλούν έγκαιρα, έως τη Δευτέρα 28-10-2024 και ώρα 15:00, ώστε να παραληφθούν μέχρι 29-10-2024 που θα λάβει χώρα η πρώτη Συνέλευση, έτσι ώστε αν υπάρχει απαρτία να ληφθούν υπόψη και αυτά τα ψηφοδέλτια.

Τα Μέλη της Εξελεγκτικής - Εφορευτικής Επιτροπής (ΕΕΕ)

Ι. Μπακογιάννης Π. Γιούτα-Μήτρα Σ. Μπακογιάννης



**International Society for Soil Mechanics and  
Geotechnical Engineering**

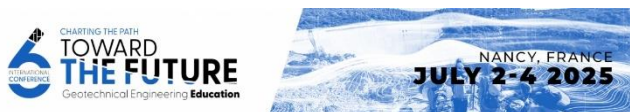
## Extension of Abstract Submission Deadline for the 12th International Conference on Scour and Erosion (ICSE-12) Chongqing, China 2025

ISSMGE Secretariat / [TC213](#) / 02-09-2024

The Abstract Submission Deadline for the 12th International Conference on Scour and Erosion (ICSE-12) has been extended to 1 October 2024: <https://icse12.cqjtu.edu.cn>.

## Extension of Abstract Submission Deadline for the 6th International Conference on Geotechnical Engineering Education 2025 (GEE2025)

ISSMGE IT Administrator / [TC306](#) / 04-09-2024



The abstract submission deadline for [GEE 2025](#) is extended to **October 15, 2024**.

Please note that the paper submission deadline will remain February 5, 2025 - there will be no extension for the papers.

The Conference is organized by the Technical Committee TC306 for Geo-engineering Education of the ISSMGE, under the auspices of the French Society for Soil Mechanics and Geotechnical Engineering (Comité Français de Mécanique des Sols et de Géotechnique - CFMS) and the Ecole Nationale Supérieure de Géologie, Université de Lorraine, France.

The Conference GEE2025 has two priority themes (in addition to more typical education themes such as curricula, coursework and educational material) that include:

1. Teaching of Unsaturated soils
2. Use of numerical modeling to support teaching

## Hybrid panel discussion titled 'Ground-Structure Interaction'

ISSMGE Secretariat / [TC103](#) / 03-09-2024

Dear all,

The Numerical Methods in Practice subcommittee of the AGS Sydney Chapter has organised a hybrid panel discussion titled **Ground-Structure Interaction**.

This panel discussion aims to enhance collaboration between geotechnical and structural engineers to improve accuracy, efficiency, and overall design quality.

Details of the event are listed below:

**Date & Time:** Wednesday 11 September 2024, 5:30 pm - 8:00 pm (AEST)

**Type:** Hybrid

**Location for In-Person Attendance:** Engineers Australia Sydney Office

Event Webpage & Registration link: <https://australiangeomechanics.org/meetings/ground-structure-interaction/>

### Event Schedule:

- 5:30 to 6:00 - Networking
- 6:00 to 6:10 - Welcome address and introduction of Numerical Subcommittee and its objectives
- 6:10 to 6:40 - Introduction of panellists and a 5-minute talk by each on their preferred topic
- 6:40 to 7:00 - Panel discussion
- 7:00 to 7:20 - Q&A session
- 7:20 to 7:30 - Vote of thanks, presentation of trophies and group photo
- 7:30 to 7:50 Networking

The TC103 and ISSMGE members can enter the following code at the end of their registration to receive complimentary access: **ISSMGE2024!**

## 2024 INTERNATIONAL LIFETIME ACHIEVEMENT MEDAL (ILAM)

ISSMGE IT Administrator / General / 04-09-2024



The ISSMGE is pleased to announce the two winners for the 2024 INTERNATIONAL LIFETIME ACHIEVEMENT MEDAL (ILAM): Prof. Suzanne Lacasse & Prof. Norbert Morgenstern.

The 2 winners were chosen by the ISSMGE Board on Monday, the 15th of July, 2024, after the Awards Committee (AWAC) had reviewed the nominations of 15 candidates representing all 6 regions from around the world, that met stringent requirements and criteria. According to the rules, the medals will be delivered to the winners by the President or the Vice-President of ISSMGE.





## ITT-TC103

ISSMGE IT Administrator / [TC103](#) / 09-09-2024

Dear all,

The **Interactive Technical talk of TC103** is now online!  
Don't miss it!

<https://www.issmge.org/education/interactive-technical-talks/19-numerical-methods-tc103>

## 5th TC222 workshop on Oct 24th

ISSMGE Secretariat / [TC222](#) / 25-09-2024

We have the pleasure of inviting you to the Fifth workshop of TC222 Geotechnical BIM and Digital Twins. The workshop is free and will be online via Teams.

**When:** Oct 24th 2024 | 12.00 (Paris), 18:00 (Hong Kong), 06:00 (New York)

**Duration:** 2 hours

The theme of the workshop is **National Geotech Databases & Asset Registers - Part 2** with talks from Edward Lewis (BGS), Hilikka Kallio (GTK), Stefan Volken (SwissTopo) and Stevan Lukic (Civils.ai).

To attend, please sign up using this Forms link:  
<https://forms.office.com/e/Y1mPW1ffBv>

A Teams meeting invitation will be sent shortly after signup.

All are welcome to attend this workshop. Please feel free to share this invitation to your network.

We hope you can make it to this event!

Kind regards,  
Mats Kahlström (secretary)

## Geotechnical Engineering Education Conference

Francesca Ceccato / [TC103](#) / 24-09-2024

### CALL for Abstracts for the next Geotechnical Engineering Education Conference (GEE2025)

The sixth international conference of ISSMGE-TC306 Geotechnical Engineering Education GEE 2025 will take place in Nancy, France, on July 2-4, 2025 (<https://gee2025.sciences-conf.org/>).

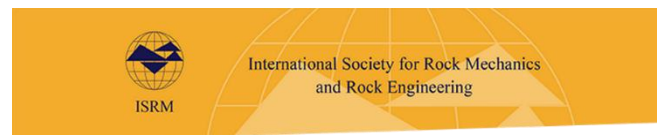
The **abstract submission deadline** for GEE 2025 has been extended to **October 15, 2024**.

Themes for paper submission

- Curricula: Undergraduate, (Post)Graduate, Doctoral
- Coursework: Laboratory, Field, Project-based, Numerical Methods
- Open Resource Educational Material
- Applications of ICT Tools
- Links to Research on Learning and on Engineering Education
- Priority Theme 1: Teaching of unsaturated soils
- **Priority Theme 2: Use of numerical modelling to support teaching**

Note that Priority Theme 2 is the result of a collaboration between TC306 and TC103.

The GEE series of proceedings is listed by Scopus and that the proceedings of the TC306 conferences, starting from the 2<sup>nd</sup> in 2008, are available through the ISSMGE online library (<https://www.issmge.org/publications/online-library?data-base=3&conference=all>).



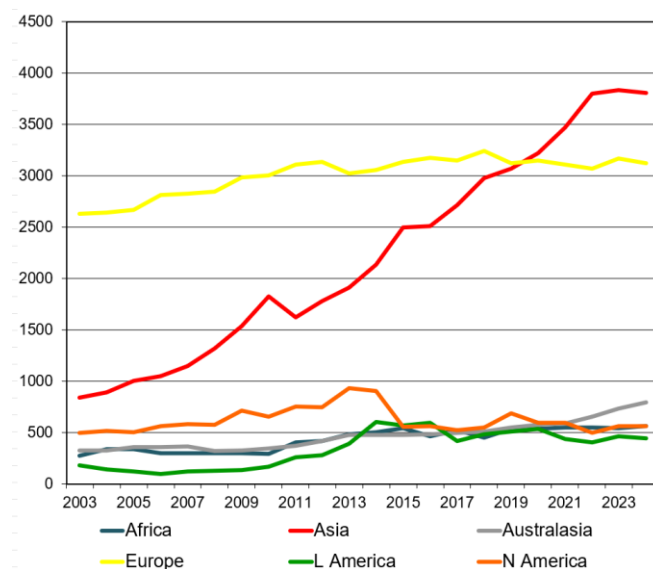
## ISRM Council Meeting, 23 September 2024 - News Release



The ISRM held its 2024 Council meeting on 23 September in New Delhi, India, in conjunction with the 13th Asian Rock Mechanics Symposium - ARMS13 and the 2024 International Symposium.

43 National Groups were represented at the Council, which was also attended by the Board members, the Past President Resat Ulusay, and observers from the Commissions and the National Groups.

Reports of the Board members and Board Committees, as well as the forthcoming conferences were presented. Issues concerning the FedIGS were discussed



The annual Board meeting and the Commission meetings took place before the Council. Several well-attended courses and workshops took place during the 2 days preceding the conference.

### Membership of the ISRM

The ISRM has a membership of approximately 9300 individual members and 167 corporate members, belonging to 61 National Groups. After two decades of continuous growth, the number of individual members has stabilized during the last two years. The National Groups of Morocco and Iran joined the Society during 2024.

### 2026 ISRM International Symposium will be held in Fukuoka, Japan

The National Groups of Macedonia and Japan presented excellent proposals to host the 2026 ISRM International Symposium. The Council, by secret ballot, selected the proposal by Japan, in Fukuoka, from 22 to 26 November, where the Board, Council and Commission meetings of 2026 will take place.

### ISRM Award winners were announced

**Rocha medal 2025:** The Rocha Award Committee selected the winner of the Rocha Medal 2025 and two runners-up.

**Winner:** Lucille Carbillet, FRANCE; Université de Strasbourg, FRANCE.

**Runners-up:** Georgios Tzortzopoulos, GREECE - École Centrale de Nantes, FRANCE

Quan Zhang, CHINA, China University of Mining and Technology, CHINA.

**Science Achievement Award 2024:** Weiren Lin, JAPAN; Pinnaduwa Kulatilake, SRI LANKA.

**Young Rock Engineer Award 2024:** Gabriel Walton, USA.

### ISRM Board meeting held on 22 September



The ISRM Board met in a physical meeting prior to the Council meeting. A detailed discussion on the past activities took place and decisions were taken for future activities.

### News

<https://www.isrm.net>

### 6th European Rock Mechanics Debate on 16 October 2024-09-25

The debate's title is "Failure criteria: Mohr-Coulomb vs Hoek & Brown," and the speakers are **Joseph Labuz** from the University of Minnesota, USA, and **Ming Cai** from Laurentian University, Canada. **Philippe Vaskou**, from France, will moderate the debate.

[Download the flyer](#) with complete information.

As the maximum number of attendees has been reached, you can now watch the debate through ISRM's YouTube channel: <https://www.youtube.com/@IntSocRockMechanics>.

## 6<sup>TH</sup> ISRM EUROPEAN ROCK MECHANICS DEBATE Failure criteria: Mohr-Coulomb vs Hoek&Brown

Time: 2024, October 16<sup>th</sup>, 16:00 (CET)

Links: inscription ([https://us06web.zoom.us/join/joinMeeting/register/tZAoce2gDorHNMtIPzYU8bMiaxOU3f77\\_Y](https://us06web.zoom.us/join/joinMeeting/register/tZAoce2gDorHNMtIPzYU8bMiaxOU3f77_Y)) & YouTube channel (<https://www.youtube.com/@IntSocRockMechanics>).

Copy – paste the link in your browser to register and attend the zoom meeting or to follow the debate on the YouTube channel.

Moderator: Philippe Vaskou (France)

### Speaker 1: Joseph Labuz (University of Minnesota - USA): Mohr-Coulomb



Dr. Labuz is a Professor in the Department of Civil, Environmental, and Geotechnical Engineering at the University of Minnesota. He received his degrees in civil engineering, with BS from Illinois Tech, MS and PhD from Northwestern University. In 1987, he joined the faculty at the University of Minnesota. His awards include best papers (48th US Rock Mechanics Symposium, 2014; Giovanni Barla Best Paper, Rock Mechanics and Rock Engineering, 2022) and an honorary chair (Department of Civil and Construction Engineering, National Taiwan University of Science and Technology, 2016). He is a Fellow of the American Society of Civil Engineers and the American Rock Mechanics Association. His research activities have focused on experimental geomechanics, lately dealing with fluid-rock interactions related to mineral carbon storage.

### Speaker 2: Ming Cai (Laurentian University - Canada) – Hoek & Brown



Dr. Cai is a Full Professor in Laurentian University's School of Engineering and Computer Science and holds a position as Geomechanics Research Chair. Dr. Cai holds Bachelor's and Master's degrees from Tsinghua University in China and a PhD degree from the University of Tokyo in Japan. Prior to joining Laurentian University, he worked for Mansour Group Inc., MIRARCO, Tokyo Electric Power Services Ltd., and Tsinghua University and had over 30 years of research, education, and industry experience. He has a wide variety of interests in rock mechanics and rock engineering and has made exceptional technical and scientific contributions to this field. Dr. Cai is the author/co-author of more than 250 scientific publications. He was awarded the Canadian Geotechnical Society's John A. Franklin Award in 2017 for his contribution to rock mechanics and rock engineering.

### 47th ISRM online lecture is online 2024-09-19

The 47th ISRM online lecture was delivered by **Prof. Ranjith Pathegama Gamage**, from [Monash University](#), Australia. The lecture title is: "Deep Geothermal Energy: A Key Player in the Sustainable Energy Mix". It was broadcast in 19th September, from the [Online Lecture's page](#).



### News

<https://about.ita-aites.org/news>

### In memoriam - Claude Bérenquier (1942-2024) 04 September 2024

Organisations are created by individuals instrumental in their formation and subsequent growth. For the ITA, International Tunneling and Underground Space Association, there are few more influential in its early development and survival than Claude Bérenquier. When the Association was founded in 1974 and its Secretariat established in France, Claude headed that Secretariat team as its Secretary General. He remained in that post for more than 30 years to 2011, when he continued his dedication to the Association as a driving force behind the creation of the ITACET Foundation which has



been organising training courses all over the world for the past 15 years.

It is with deep sadness that we announce that Claude died suddenly and unexpectedly after suffering a heart attack on Friday, 30 August 2024, aged 82.

For many in the ITA family of 80 Member Nations, Claude will be remembered as a fine diplomat, expert administrator and tireless promoter of underground infrastructure, its use, design and construction.

Claude studied civil engineering and graduated as an Ingénieur des Travaux Publics de l'Etat from the ENTPE - Ecole Nationale des Travaux Publics de l'Etat in Vaulx-en-Velin, a small town east of Lyon, in 1965 and began his professional career at CETU – the Centre d'Etudes des Tunnels in Bron, Lyon. This was followed by a move to Paris where he worked for three years with the Ministry of Economy and International Affairs before returning for another six years of study at the ENTPE.

Together with taking on the position of Secretary General of the ITA, Claude began his career as a skilled communicator and influential civil servant with a period of 1989 to 1992 working for SETRA, the Service d'Etudes Techniques des Routes et Autoroutes (Public Institute on Roads and Motorways). This was followed with a four-year association with CETE Méditerranée, an association for Public Consulting on Roads, Transport, Environment and other infrastructure in the Mediterranean region, and from 1996 to 2000 with CO-DATU – Coopération pour le développement et l'amélioration des transports urbains et périurbains to promote cooperation for the development and improvement of urban and suburban transportation. Before retiring after 36 years of outstanding public service in 2002, he supported the work of CNAM – the Conservatoire National des Arts et Métiers (National Institute of Technical Sciences).

For the ITA, Claude's guiding principal was appreciation that the Association is a federation of its Member Nations. Through his skilled administration, Claude oversaw the growth of the Association and its activities and worked tirelessly to increase its influence in the promotion of the use of underground infrastructure throughout the world, taking in his stride smooth operation of its Secretariat services and managing the duties of the General Assemblies of the Member Nations each year. Claude applied these same qualities and with equal energy and dedication to the ITACET Foundation, ensuring its efficient operation and managing training courses on wide ranging topics to support the development and operation of underground infrastructure across the world.

We will miss our colleague and friend deeply and will remember Claude's contributions to ITA in memorials at ITA events and with ITA Member Nation societies that owe so much of their success to Claude's untiring support and promotion.

R.I.P. Claude

**ITACET LUNCHTIME LECTURE SERIES #38** 10 September 2024

Join the next LLS #38!

When: 10th September, 2024

The rapid development of mechanised tunnelling in the last decades has increased the tunnelling community's focus on the environmental aspects of tunnel construction. The excavation carried out by using EPB (Earth Pressure Balance) machines often requires the use of foaming agents, specific products that are added to the medium intended to be excavated,

in order to make the excavation process possible. The produced muck can be considered more than a simple "land-fill material" and its re-use is strongly suggested in view of sustainable excavation and circular economy principles. However, the correct management process should be followed. This process should take into account the presence of the used additives in the mucking itself.

This instalment of the Lunchtime lecture series will focus on 'EPB tunnelling: environmental aspects and re-use opportunities of the conditioned muck' in collaboration with ITA-AITES WG15.

The episode will feature three lectures and will finish with a Q&A with all speakers. It will begin at 13:00 CET.

- The conditioning phase in EPB tunnelling and the issue of muck disposal - Prof. Carmine Todaro
- Environmental aspects of the conditioning phase, chemical profile of foaming agents and the biodegradation process: the Italian approach before muck re-use - Dr. Anna Barra Caracciolo
- The muck as a raw ingredient for industrial production, its physical transformations and treatment, including examples from construction sites - Prof. Robert Galler.
- Discussion and Q&A moderated by Dr. Nikolai Bobylev

To register: [Lunchtime lecture series #38 | Itacet](#)

### **Scooped by ITA-AITES #123, 3 September 2024**

[Snowy 2.0 confirms fourth TBM to protect project timeline | Australia](#)

[China's tunnel boring machine sector leaps ahead, manufacturing 7 out of 10 TBMs used globally](#)

[Thane metro project attracts five consultants for initial design phase | India](#)

[The backbone of Western Sydney | Australia](#)

[Kyrgyzstan launches new energy infrastructure projects](#)

[GDC authorises \\$3.8bn Hudson Tunnel Project loan | USA](#)

[President Ilham Aliyev visits construction site of 4th tunnel and 15.2-kilometer section of the Toqhanaly-Kalbajar-Istisu highway | Azerbaijan](#)

[Cairo Metro Line 1 gets €800mIn upgrade | Egypt](#)

[The world's 10 longest tunnels - including three in the same country](#)

[Tunnel boring machine completes 903m tunnel in Chennai | India](#)

### **Scooped by ITA-AITES #124, 17 September 2024**

[The £3.9bn tunnel that could solve Sweden's traffic problems](#)

[Mumbai-Ahmedabad Bullet Train route will have 21 km tunnel under Arabian Sea! | India](#)

[Netherlands in the race for massive underground telescope project: Budget Day leak](#)

[Učka Tunnel fully opens for traffic into Istria | Croatia](#)

[New research highlights the role of urban underground space in achieving carbon neutrality](#)

[Mumbai's 5 mega infrastructure projects to open this year, four in 2025 | India](#)

[Countdown to Thessaloniki Metro opening after two-decade wait | Greece](#)

[Denver International Airport builds new underground tunnels: Here's what's inside | USA](#)

[Grand Paris Express: everything you need to know about the future metro line 17 - France](#)

[First bore of the Semmering Base Tunnel broken through | Austria](#)

[The longest tunnel in the world is about to shut down | USA](#)

[ITA Awards and SIG Conference registration now open](#)



### BTS Conference 2024

October 8th - October 9th, 2024

QEII Centre, Westminster, London SW1P 3EE, UK

[Download Flyer](#)

There is less than one month to go to the BTS 2024 Conference and Exhibition!

- 800 + Tunnelling Professionals
- 55 + Global Tunnelling Brands
- 2 days of Learning, Debate and Analysis

The BTS 2024 Conference and Exhibition is the largest gathering of tunnelling professionals in the UK. Taking place on October 8th - 9th, 2024 at the QEII Conference Centre, Westminster, London, this event is an essential meeting point for everyone involved in the design, construction and operation/maintenance of today's underground infrastructure.

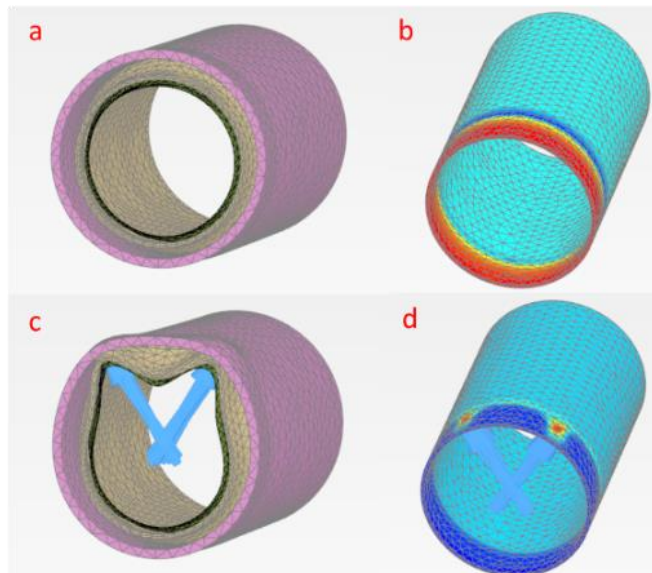


## BTSYM September Workshop

### Composite SCL tunnels – The development and current status

Speaker: Jiang Su

Thursday, 19 September 2024,  
Institution of Civil Engineers, One Great George Street,  
Westminster, London SW1P 3AA



#### Event Information:

This workshop will discuss the development of SCL tunnels in the UK from being a temporary structure to a permanent structure. It then talks about the rise of composite lining and its applications in the UK over the last 20 years. Some case studies on composite linings and the key engineering principles will be presented.

#### Speaker:

**Jiang Su** is a chartered civil engineer with 18-year experience on some of world's biggest construction projects, including Crossrail, Thames Tideway, High Speed 2, Silvertown Tunnel, Dubai Metro, London Underground Station upgrade and Sizewell C. Jiang has a PhD degree in composite SCL tunnels and sprayed waterproofing membranes. He is a Fellow of the Institution of Civil Engineers and an Associate Editor of the ICE Proceeding – Geotechnical Engineering.

## BTSYM November Lecture

### Overcoming challenges in horizontal directional drilling – a geotechnical engineer's perspective

Speaker: Serena Che

Thursday, 7th November 2024  
Institution of Civil Engineers, One Great George Street,  
Westminster, London SW1P 3AA  
This lecture can be watched online ([Click here](#))

#### Event Information:

Horizontal directional drilling (HDD) is a trenchless method commonly used for pipeline and cable installation. It is ideally suited to crossings beneath natural and man-made obstacles and offers substantial cost, safety and environmental benefits. Despite the wide use of HDD, there remain concerns regarding project risk in certain situations. Key to HDD success



is good management of the drilling fluid and the avoidance of excessive mud loss.



Fundamental risks in HDD arise from pressure build-up in-bore leading to hydrofracturing of the ground, heave of the overburden and mud loss – either to formation, subsurface infrastructure or up to the surface. Poor cuttings transport is a main trigger for bore blockage, leading to potential hydro fracture and the manifestation of the hazards associated with these risks.

In this lecture, a case study involving HDD bores for cable landfall of an offshore windfarm is discussed. The aforementioned risks associated with mud loss are most severe in this type of HDD where drilling starts at a clifftop and descends to punchout in the seabed. In-bore pressures before punchout are elevated by the hydrostatic head of the drilling fluid from the clifftop entry pit. Other geotechnical challenges encountered onsite will be discussed, along with the analysis of rare annular pressure monitoring data which provided valuable insights into the behaviour of cuttings in the bore. This lecture concludes with some lessons learnt, recommendations to minimise the risks of hydro fracture and bore blockage, and advice to other young engineers interested in this field.

### Speaker

**Serena Che** is a senior geotechnical engineer at Geotechnical Consulting Group (GCG). She joined GCG after she completed her MSc in Soil Mechanics at Imperial College. She has also been a science, technology, engineering, and mathematics (STEM) ambassador since 2021.

Serena has worked closely with developer and contractor clients on various energy, infrastructure and building projects within the UK and internationally. Her work has a focus on early stage optioneering as well as advising clients on a range of geotechnical risks throughout the project lifecycle.

From 2022 to 2023, Serena took up a technical advisory role as the on-site geotechnical engineer for an offshore wind developer for their cable landfall horizontal directional drilling (HDD) works for an offshore windfarm. During her site work, she contributed to overcoming several interesting geotechnical and drilling-related challenges. She recently published and presented a paper related to her site work in the European Conference on Soil Mechanics and Geotechnical Engineering (ECSMGE 2024).



### News

#### Global Gathering For IGS Technical Committee Workshop September 3, 2024

Seventy-two experts from four continents gathered to examine the uses and potential of geosynthetics in reinforced fill structures.



The technical workshop on 'Reinforcement and Drainage in Soil Structures' held in Barcelona was an opportunity for detailed discussion on the global issues and opportunities in this area.

The three-day event, from June 25-27, was organized by the IGS Technical Committees on Soil Reinforcement (TC-R) and Hydraulic Applications (TC-H), and the Technical Committee on Reinforced Fill Structures (TC-218) of the International Society for Soil Mechanics and Geotechnical Engineering (ISSMGE).

TC-R chair Pietro Rimoldi said the workshop had several aims including sharing new developments, design guidance and methods, case histories, and the resilience and sustainability aspects of such geosynthetic materials.

The symposium, held at the Universitat Politècnica de Catalunya (UPC), had contributions from speakers including IGS President Sam Allen, Jorge Zornberg, Richard J. Bathurst, and David Shercliff, as well as social evenings, and a visit to the famous Sagrada Família church.

TC-R chair Pietro Rimoldi said: "It was a very successful event which included 41 participants from industry and 22 from academia including three students, coming from 23 countries across four continents.

"We had an excellent balance of speakers between academics and practitioners addressing topics that matter right now including climate change, and there was plenty of time for interaction and discussion. Proceedings with the 30 high level papers are currently being finalized and will be published on the IGS website soon.

"Thanks to sponsors HUESKER Group and Viganò Pavitex, and the support of VSL International Ltd, UPC for hosting, and IGS Spain's Ivan Puig Damians for local organization.

"I am sure we will repeat this event with the ISSMGE in the future."

Explore more about the IGS Technical Committees [here](#).

## MSE Walls Boost Sustainability In Egypt Seaside Project September 4, 2024



### Providing A Cost-Effective And Sustainable Solution With Paramesh MSE Wall At A Seaside Development In Egypt

Telal El Sokhna is a real estate development project along the longest beach line in Ain El Sokhna, Egypt. To ensure a panoramic view of the sea for the community, the architect designed the project at several levels, which necessitated a long and high retaining wall (560m long & 19m high), parallel to the shoreline.



**Company:** Maccaferri  
**Client:** Roya Developments  
**Location:** Ain El Sokhna, Egypt  
**Applications:** Reducing costs and boosting sustainability by replacing a cantilever wall with a gabion faced MSE wall  
**Benefits:** Environmental sustainability, cost and time savings, improved safety

The original design consisted of high cantilever walls for soil retention. However, through Maccaferri's local agent Strata Soil Systems, the contractor proposed a gabion faced Paramesh MSE wall as a cost and time effective alternative. This choice was primarily influenced by the need for the wall face to integrate with the surrounding mountains, since the gabion could be filled with local stones.



**INTERNATIONAL GEOSYNTHETICS SOCIETY**  
The International Geosynthetic Society (IGS) is a learned society dedicated to the scientific and engineering development of geotextiles, geomembranes, related products, and associated technologies. We are registered as a non-profit corporation.

Bearing capacity was the key aspect in the design of retaining wall options because the in-situ soil was insufficiently competent, requiring deep excavation for a concrete wall, while a Paramesh MSE wall could be constructed at a shallow depth. Implementing the Paramesh MSE wall resulted in a 40% cost savings for the client.

An MSE wall was also the environmentally friendly option, evidenced by a comparative Life Cycle Assessment carried out between this and the original cantilever wall design. The MSE approach lowered their environmental impact by more than 90% in each of several impact categories studied. The Telal El Sokhna project demonstrates how sustainability can be achieved with geosynthetics in soil retention applications without compromising traditional engineering design requirements.



To find out more, contact Maccaferri Middle East by emailing at: [info.eme@maccaferri.com](mailto:info.eme@maccaferri.com).

The IGS Sustainability Committee is committed to communicating the positive environmental impact of using geosynthetics. Improving worldwide understanding of the sustainability benefits of geosynthetic materials, and supporting the geosynthetics industry maximize the sustainability potential of their projects. For more information, visit our webpage at [www.geosyntheticssociety.org/sustainability](http://www.geosyntheticssociety.org/sustainability).

Would you like your product or initiative featured here? Contact IGS Secretariat Manager Elise Oatman at [igssec@geosyntheticssociety.org](mailto:igssec@geosyntheticssociety.org).

[www.geosyntheticssociety.org](http://www.geosyntheticssociety.org)

A gabion faced MSE wall project at a housing development by the Red Sea lowered the environmental impact by more than 90% compared to the use of alternative materials.

The latest profile in the IGS Sustainability Case Study series details how Maccaferri Middle East's soil retention project at the Telal El Sokhna real estate site replacing a cantilever wall, reduced time and costs while improving sustainability and longevity. It was also an elegant solution enabling local rocks to be used in the gabion cage, ensuring aesthetic integration with the mountainous surroundings.

**Launched** in March, last year, the IGS Sustainability Case Study series highlights how geosynthetics can offer a more sustainable solution in construction projects. Available as one-page pdfs, the profiles are easily downloaded and shareable.

Access the latest case study and more on the IGS Sustainability web page [here](#), where you can also find more resources including eBooks, videos, and papers.

+++ Does your geosynthetics project demonstrate how geosynthetics benefit the environment? For a chance to feature in an IGS Sustainability Case Study, email IGS Secretariat Manager Elise Oatman at [igssec@geosyntheticssociety.org](mailto:igssec@geosyntheticssociety.org) with some basic details.

## 12th ICG TC-Barriers Workshop Report Now Available September 6, 2024

**IGS**  
**TC-B Barriers Workshop - Geosynthetic Barrier Quality Assurance, Quality Control, and Installation**  
September 2023  
Workshop report by Jonathan Shamrock, compiled from summaries and inputs from the workshop participants.  
In September 2023, as part of the 12th International Conference on Geosynthetics held in Seoul, Korea, the International Geosynthetic Society, Technical Committee on Barriers (TC-B), held a workshop session on Wednesday 20 September from 14:00 to 18:00 as part of the conference programme.  
A team of 10 invited speakers delivered their experience and insights on the topic of Geosynthetic Barrier Quality Assurance, Quality Control, and Installation. Each presentation was accompanied by a written abstract available from the IGS website at the end of the presentation or available on request.  
**First session chair: Jonathan Shamrock**  
TC-B representative  
Jonathan from Truax & Taylor Ltd, gave a brief presentation on the activities of the TC-B committee since the last ICG in Seoul in 2018. The activities included:  
• Dipping speakers focusing on specific technical issues of barrier manufacturing, installation and performance. To date, 16 speakers have delivered with an average registration of over 200 per event demonstrating the demand for the content. This was also reflected in the 2024 committee election regarding the speakers.  
• Revised barriers in-situ (not certified and installed)  
• Consider support of a GCLs Technical section delivered to the Philippines in March 2023 on geosynthetics in-situ.  
• 2 sessions of GCLs conference in February 2023.  
• Liaison with GCL Association team for the inaugural Korea Korea return to be delivered at the 2024 ICG in Seoul in September which will feature a regular feature of Korea GCLs.  
• Preparing TC-B committee list of barrier courses and content for the IGS e-learning programme - joint discussion on geosynthetics for Sustainable Development delivered at 4 April 2023.  
• Joint webinar with ICG on Service Life of Geomembranes in Hydraulic Applications, 7 June 2023.  
• Future planned events of the TC-B include:  
• Webinar series focusing on specific technical issues of barrier manufacturing, installation and performance. Please let us know if you have any topics you would like to see discussed.  
• Geosynthetic barrier course, to be the new committee for GCLs, focusing on barrier design and installation. This will be the new committee for GCLs, focusing on barrier design and installation.  
• Convert the Philippines webinar into a Geosynthetics in-situ video for the IGS e-learning programme.  
• Preparation of a 2024 Paper on a Worldwide Database of Geosynthetic Regulations using Geosynthetic Barriers.

- Preparing TC-B barrier courses and reviewing the barrier sections of the IGS handbook for the 2024 e-learning programme.
  - Arranging the next workshop on focal barrier issues, following Munich and Barcelona, scheduled to be delivered in Seoul, Korea.
  - TC-B sessions at regional conferences.
- Boyd Ramsey - To do and not to do during geomembrane installation.**  
Boyd, an independent consultant from Boyd Ramsey Consulting, highlighted that the topic of geomembrane QA has been extensively covered in conferences, webinars and publications, including topics on the subject. However, there is still a need to ensure that the focus is on the practical outcomes in terms of field site applications. The suggested topic should be focused for a geosynthetic barrier installation:  
• Decide how much sleep is available - You will make all other decisions  
• Make the job geometry as simple as possible  
• Make the penetrations and connections as simple as possible  
• Hire and design engineer and geosynthetic installer who are experienced at the level of performance you are seeking  
• Use a reputable material supplier  
• Have a GCL firm to assist with use of them
- The next 15 min section of the presentation was summarised with a quote and with a series of photos showing site installation practice. At under the title of 'Don't do that stuff, and do the right thing, please are you a frequent reader. The quote used to illustrate the 'you get what you pay for' principle is, 'Don't buy cheap and it will cost you. It's a waste of money to buy cheap and it will cost you. When you pay for what you get at 100% money - that's all. When you pay for the quality you get what you pay for. However, the price you pay is not responsible for the quality of the work. If you are with the lowest bidder, it is not a good thing for the site and you, and if you do that you will have to live with the consequences.'
- 

Digest a summary of the discussions and learnings gained from the IGS Technical Committee on Barrier Systems (TC-B) workshop held at last year's [12th International Conference on Geosynthetics](#) (ICG).

The report summarizes presentations made by a range of experts during the workshop held on September 20, and covers insights into Geosynthetic Barrier Quality Assurance, Quality Control, and Installation.



Photo of the TC-B CQA panelists

The recap includes an update by TC-B chair Jonathan Shamrock on the activities of the Committee since the last ICG in Seoul, South Korea, in 2018, and future planned events. This is followed by summaries on the following talks:

- Boyd Ramsey, of Boyd Ramsey Consulting – *'To do and not to do during geomembrane installation'*, which outlines suggested basic steps for successful barrier installation.
- Todd Harman, of Hallaton Environmental Linings – an introduction and update on the International Association of Geosynthetic Installers, of which Mr Harman is President.
- Bruno Herlin, of Terrafix Geosynthetics – *'Using the appropriate GCL based on the working conditions/application'*.
- Samuel Allen, of TRI Environmental and IGS President – *'Importance and suggestions for QC and QA of geomembranes and GCLs'*
- George Koerner – *'Interpretation of geosynthetic barriers test results during QA'* where Dr. Koerner, from the Geosynthetic Institute (GSI), presents on the differences be-



tween Material Quality Control (MQC) and Construction Quality Assurance (CQA).

- The outcome of a panel discussion facilitated by Amir Shahkolahi, TC-B secretary, on current HDPE geomembrane dual track fusion weld welding standards. Panelists were Eddie Weiser (Leister), Bruno Herlin (Terrafix), Boyd Ramsey (Boyd Ramsey Consulting), Todd Harman (Hallaton Environmental Linings), Jonathan Shamrock (Tonkin + Taylor), Samuel Allen (TRI), George Koerner (GSI) and Kent von Maubeuge (Naue).

Read the full report [here](#).

During the event, the TC-B held a separate moment of appreciation for two special individuals, Kent von Maubeuge and Boyd Ramsey, former chair and vice chair of the committee.



TC-B Chair (Jonathan Shamrock) and TC-B Secretary (Amir Shahkolahi) presenting a Māori Patu to Kent and Boyd in recognition of their service to the TC-B.

Learn more about the IGS's Technical Committees [here](#).

### 10 minutes With... Ness Di Battista September 9, 2024

Watch IGS Young Member and Assistant Professor Ness Di Battista share her path to civil and geotechnical engineering.

Prof. Di Battista, of the Université de Sherbrooke in Quebec, Canada, is the latest in our '10 Minutes With...' video series, a spin-off to our '10 Questions With...' articles that offer an insight into the working lives of geosynthetic professionals.

In our latest video, Prof. Di Battista explains her work specialising in barrier containment systems, current projects and when she first heard about geosynthetics.

She also shares her experience as a female engineer in a male dominated industry and the impact mentors have had in her development. She offers advice to young engineers and explains the value of being an IGS Young Member and the importance of nurturing this community.

Click below to watch.



<https://www.youtube.com/watch?v=qqjOAGMDW2U&t=3s>

\*\*\* Don't miss our debut video with IGS President Sam Allen, which you can watch [here](#).

### 10 Questions With... Vivi Anggraini September 16, 2024



IGS Malaysian (MyIGS) Chapter President Vivi Anggraini

IGS Malaysia, known as MyIGS, has welcomed a new President – its newest for just over 10 years. Here, Vivi Anggraini tells us a bit about her path to IGS involvement, her aims for her two-year term, and gives us an insight into the geosynthetics market in the region.

#### **Congratulations Vivi on your new role. How do you feel?**

I am deeply honoured to take on the role of President for IGS Malaysia. It is a tremendous responsibility, and I am committed to advancing the society's goals and supporting our members. This position allows me to contribute significantly to the geotechnical community, and I look forward to working collaboratively with our team and stakeholders to drive positive change and innovation in our field.

I am the second female President of MyIGS, after the Immediate Past President, Dr. Fauziah Ahmad, who was in the position since MyIGS's formation in 2013.

#### **Please introduce your Chapter officers.**

Our Vice President is Ingenieur (Ir.) Marcus Jong Ching Joo, who helps me oversee the Chapter's activities and operations. He also serves on the IGS Technical Committees for Reinforcement, Hydraulics, and Stabilization (TC-R, TC-H, and TC-S). He will oversee technical matters related to these areas and share updates from the Technical Committees with Malaysian members.

Our Treasurer is Ir. Colin Lim, managing the financial affairs of the Chapter. He also serves on the IGS TC-B. The Secretary position is currently vacant because the elected general secretary stepped down.

#### **Tell us a bit about yourself – how did you get involved with the IGS, and what previous positions have you held?**

Joining MyIGS in 2016 as an executive member was a pivotal moment for me, marking the beginning of an exciting journey within a vibrant community of professionals dedicated to advancing geotechnical engineering.

My active involvement, from organizing public lectures to participating in the first Educate the Educators (EtE) program by the Australasian Chapter of the IGS, has deepened my connection to the field. The opportunities to publish journal articles and book chapters on geosynthetics within this supportive network have further fuelled my passion. I have also



consistently presented at geosynthetics conferences around the world.



MyIGS Officers and Chapter Members

### **What do you do outside the IGS – what is your area of interest or expertise in geosynthetics?**

I am currently a senior lecturer in geomechanics at Monash University, Malaysia Campus. My research interests focus on ground improvement, environmental geotechnics, gas CO<sub>2</sub> sequestration in liners, geotube for marine applications, geosynthetics in landfills and compacted clay liners.

I've contributed to the field by authoring the book '*Ground Improvement Techniques*' and as a working member of the Construction Industry Development Board (CIDB) and Waste Management Association of Malaysia (WMAM).

As a lecturer and researcher, I've been actively involved in solving industry problems and have secured funding from Solmax to collaborate with them. I've introduced geosynthetics topics in two of my units at Monash University, and there is an upcoming opportunity to receive an award from Solmax for the best project reports.

### **What are your aims for the Chapter during your term – what do you hope to achieve for members and geosynthetics in Malaysia?**

My term runs 2024-2026 and my aims include:

- Strengthening member engagement, enhancing MyIGS member collaboration by organizing events, workshops, and public lectures that address both academic and industry needs, and expanding initiatives like the EtE program.
- Promoting geosynthetics in Malaysia, increasing awareness and adoption of geosynthetics in the Malaysian construction sector by advocating for their integration into national standards and sustainable practices.
- Strengthening ties between academia and industry through joint research projects and knowledge exchange, ensuring the latest advancements in geosynthetics are effectively implemented.
- Expanding training and certification programs for geosynthetics professionals, ensuring they are equipped with the latest skills and knowledge.
- Enhancing international collaboration, positioning MyIGS as a leading ASEAN chapter by boosting participation in international conferences and collaborations, offering valuable global networking opportunities to our members.
- Supporting young professionals and students, nurturing the next generation of geotechnical engineers by provid-

ing scholarships, mentorship programs, and project awards, encouraging their active participation in the field.

### **Tell us about IGS Malaysia's membership.**

At the moment we have five corporate members, two companies, two affiliates, 15 individuals and around 10 student members.

Members typically come from a wide range of industries, including construction and infrastructure development, as well as consulting engineering firms, geosynthetics manufacturers and suppliers, research and academia.

### **Tell us about the geosynthetics market and opportunities in Malaysia.**

The geosynthetics market in Malaysia is experiencing significant growth, driven by the expanding construction sector and increasing awareness of sustainable construction practices. Geosynthetics are widely adopted in Malaysia, particularly in infrastructure projects such as road construction, erosion control, waste and flood management. The materials are valued for their durability, environmental benefits, and cost-effectiveness.

The market presents several opportunities, including ongoing and planned infrastructure projects, shift towards renewable energy (biogas/solar energy) and potential for technological advancements in geosynthetic products.

However, the market faces challenges with competition posed by imported subpar geosynthetic product from overseas which often is below the minimum standard requirement, and geopolitical tension affecting the global logistic chain.

### **What does the future hold for geosynthetics in Malaysia?**

As environmental regulations become stricter and sustainability takes center stage, the demand for eco-friendly construction practices will likely drive increased adoption of geosynthetics. In terms of specification, projects are increasingly incorporating detailed guidelines for the use of geosynthetics. These specifications ensure that the materials meet certain standards and are used correctly to achieve the desired outcomes. This is also where MyIGS can take a more proactive role in advocating the right use of geosynthetics.

### **Are there any upcoming Chapter events we can share with members?**

We plan to have an in-house webinar in collaboration with the Institution of Engineers Malaysia (IEM).

As part of our preparations, we plan to host a joint seminar within the region, in collaboration with the ASEAN (Association of Southeast Asian Nations) IGS chapters, to strengthen regional ties and knowledge exchange.

We are considering the potential of organizing an international geotechnical conference or seminar in Malaysia in December 2025. If this plan goes ahead, collaboration with the Geotechnical Engineering Technical Division (GETD) of the Institution of Engineers Malaysia (IEM) would be a strategic move. This partnership could enable us to leverage IGS resources, inviting renowned international speakers to Malaysia and further enhance the event's reach and impact.

We are also of course eagerly anticipating the 2025 GeoAsia 8 conference in Brisbane and the 13th International Conference on Geosynthetics (13 ICG) in Montreal, Canada, in 2026.

### **Anything else you would like to add?**

We are thrilled to be part of the IGS family and look forward to increasing our active participation. We also seek support from the IGS and the IGS Asian Regional Activities Committee to enhance our efforts and foster stronger collaboration.

IGS Malaysia does not have a website yet – but watch this space!

### **Geosynthetics International Announce Best Papers For 2023** September 10, 2024

Respected industry publication *Geosynthetics International* (GI) has revealed its top papers for last year.



This year GI, the IGS's official journal, chose just one winner and runner-up featuring in Volume 30, with votes cast by the Editorial Board members.

Best Geosynthetics International Paper for 2023 was:

- Naftchali, F.M and Bathurst, R.J. (2023). 'Influence of geosynthetic stiffness on analytical solutions for reinforced fill over void.' *Geosynthetics International*, 30, No. 1, 95-107.

Runner-up and earning an honorable mention as 'one of the best papers published in *Geosynthetics International*, in 2023' was:

- Giroud, J.P., Han, J., Tutumluer, E. and Dobie, M.J.D. (2023). 'The use of geosynthetics in roads.' *Geosynthetics International*, 30, No. 1, 47-80.

Editor-in-Chief Richard Bathurst said: "We thank the members of the Editorial Board for participating in the best paper selection process and congratulate the authors of these excellent papers. Each paper reflects the high standards of the Journal and is an important contribution to our geosynthetics discipline. All IGS members have free access to these papers, as they have free access to all papers published in the Journal."

IGS Members can get free access to *Geosynthetics International* by first logging into their online IGS account at <https://www.geosyntheticssociety.org/login/> and clicking on Account > Journals. Non-members can access the journal here: <https://www.icevirtualibrary.com/toc/jgein/current>.

Read the [Official Announcement](#) from the Editors of *Geosynthetics International*.

### **Geotextiles And Geomembranes – 2023's Best Papers Revealed** September 16, 2024

An analysis on geosynthetic stiffness by Robert Bathurst and

Fahimeh Naftchali has been named best paper by the *Geotextiles and Geomembranes* journal.

The paper, 'Influence of uncertainty in geosynthetic stiffness on deterministic and probabilistic analyses using analytical solutions for three reinforced soil problems', published in Volume 51(1):117-130, was chosen in the latest annual awards by the publication.



Receiving an honorable mention was 'Model tests of geosynthetic-reinforced soil walls with marginal backfill subjected to rainfall' published in Volume 51(2):342-359 by K. H. Yang, H. M. Wu, T. L. Tseng, C. Yoo.

For the awards, papers were considered for their contribution in providing significant new insights and/or potentially having a high impact on the discipline.

All technical articles, except those where the Editor was an author, were eligible, with papers voted on by the Editorial Board members.

Editor-in-chief, IGS Past President Chungsik Yoo, congratulated all the authors for "their very significant contribution to the geosynthetics discipline".

Read these and more articles in the *Geotextiles and Geomembranes* journal, and make use of your free IGS member access, by logging into your G&G account [here](#).

Read the Announcement from the Editors [here](#).

### **Businesses – Share Your Sustainability Success Stories** September 20, 2024

Bring greater attention to the green credentials of your geosynthetics projects by submitting an IGS Sustainability Case Study.

The IGS continues to communicate how geosynthetics are integral to supporting environmentally beneficial projects – but we need more case studies to reinforce the message.

- Providing A Cost-Effective And Sustainable Solution With Paramesh MSE Wall At A Seaside Development In Egypt
- Improving Sustainability With Geosynthetics In A Landscaping And Architectural Project In Dubai
- Cutting CO2 in Belgium by Improving Structural Integrity and Safety with Geotextiles
- Improving Water Safety and Conservation in Nevada with Geomembranes
- Sustainable Construction Of A Nature Reserve's Access Road And Car Park In The UK
- Optimizing District Heating Through Pit Thermal Energy Storage In Denmark

- Greener Solution To Contain Coal Mining By-Product In New Zealand
- Shepparton High-Rate Anaerobic Lagoon Cover Replacement
- Stabilization Of Levees In The Greater New Orleans Area
- Slope Stabilization for German Road Bypass

Launched 18 months ago, the [IGS Sustainability Case Study](#) series is a regular drumbeat of features showcasing engineering or construction challenges using geosynthetics to support a greener outcome.

The one-page pdfs are easy to download and share – providing a valuable resource to share across audiences, both widening knowledge for members, public and academia, and as a calling card for potential new customers.

Got a project you'd like to shout about? Submit via a simple form, describing the project, its environmental benefits using geosynthetics, and the UN Sustainable Development Goals it supports. Images of project development are also required, and contact details for further information or sales.

The case studies are posted on the IGS's dedicated Sustainability web page [here](#) – where you can also find previous case study examples – and shared on the Society's social media channels and newsletters.

#### [SUBMIT HERE.](#)

You can also get in touch with questions to IGS Secretariat Manager Elise Oatman at [igssec@geosyntheticssociety.org](mailto:igssec@geosyntheticssociety.org).



#### News

<https://www.britishgeotech.org/news>

**The October 2024 issue of Ground Engineering is available on line 11.09.2024**

The October 2024 issue of Ground Engineering is available on line. Online access to Ground Engineering (GE) is included in BGA subscriptions

This special October issue of *Ground Engineering* celebrates the British Geotechnical Association's (BGS's) 75th anniversary, with features exploring the association's developments over the last 25 years. The results of the 2024 GE100 survey are also presented in this issue, including lists of the top geotechnical firms in the UK.

On top of this, the issue includes reports on a foundation solution that was developed for a Brighton basement in chalk, and work to monitor the settlement of an earthwork embankment on a flood scheme in Wales, as well as an interview with the new British Drilling Association (BDA) chair Mark Toy.

In addition, it includes an Engineering Insight Q&A with GEM

Foundation risk analyst Marco Baiguera, and the latest news and opinion.

Use [this LINK](#) to view the latest digital issue.

To view the digital editions, along with the rest of GE's online news, opinions, features and technical papers, you need to be signed in. Use the email address you used for your BGA membership to sign in and use the reset password link if you have not yet set a password or have forgotten your password.

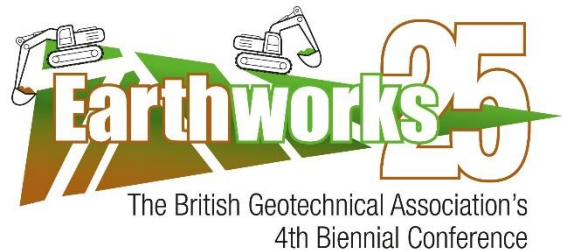
If you are having trouble with the signing in process, please contact GE's customer services team using the details listed here: <https://www.geplus.co.uk/contact-us/>

#### **Earthworks 2025 – Call for Abstracts 16.09.2024**

The BGA is pleased to announce that the call for abstracts is now open.

The 4th Biennial Conference in 2025 will be on the subject of Earthworks. The conference will be held at the University of Birmingham on 16 and 17 September 2025.

The average annual spend on earthworks in the UK is believed to be in the order of £1bn-1.5bn. Much of the knowledge base in practice was developed decades ago and by people that have mostly long-since retired. Therefore, it is necessary to relearn the basis of what is still used for successful modern earthworks design and construction, and adapt it to the many new technologies, research results, construction plant and modern contract requirements. Following on from the BGA's very successful Geo-resilience conference, Earthworks 2025 will focus primarily on the design and construction of new earthworks, where future performance in a changing climate is being explored and great benefits are being realised from flexible technical advances.



#### Call for Abstracts

The Call for Abstracts is now open and contributions on the following primary themes will be welcome via the conference website [HERE](#). The deadline for abstract submission is noon on Monday 2 December 2024.

- Design of modern earthworks
- Behaviour of engineered geo-materials
- Specification of earthworks and contract documentation
- Compaction and testing methods
- Treatment and stabilisation of earthworks
- Monitoring of earthworks and risk management
- Advances in plant and earthworks construction
- Technological advances in plant
- The impact of earthworks on society
- Case histories and the use of earthwork trials
- Building resilient and sustainable earthworks

Details of the event can be found on the conference website [HERE](#).



## Call for Entries for the Fleming Award Competition 2024 16.09.2024

Deadline - midnight on 18 October 2024

The BGA is pleased to invite entries for the Fleming Competition. This is held annually to commemorate the life and work of Dr Ken Fleming and to recognise excellence in the practical application of geotechnics in a project or a part of a project. Deadline is midnight on 18th October 2024.

The Fleming Competition is held annually to commemorate the life and work of Dr Ken Fleming and to recognise excellence in the practical application of geotechnics in a project or a part of a project.

A list of former winners can be viewed [HERE](#).

Entries are invited from Project Teams who have worked on geotechnical projects that have been substantially completed within the two years prior to the award date of December 2023.

Submitting teams will typically include representatives from Clients, Main Contractors, Consulting Engineers, Specialist Contractors and so on. The award will be presented to the Project Team which most demonstrates excellence in geotechnical design & construction. There will be an emphasis on teamwork across the different disciplines involved in the project. Consideration will also be given to projects which are innovative.

Each Team is expected to comprise between three and six people, at least one of whom must be a member of the BGA.

Submissions should be made by email to [bga@ice.org.uk](mailto:bga@ice.org.uk) by midnight on Friday 18th October.

Submissions should include:

- A completed Project Team Application Form - which can be downloaded from the Fleming Award page [HERE](#) ; and
- A brief description of the project (or section of a larger project) should be provided, with illustrations/diagrams as appropriate. The text and illustrations should occupy no more than two A4 pages, i.e. four sides.

The organisations and BGA individual or corporate members in the team should be identified, with contact details for one person to deal with correspondence from the BGA and listed on the accompanying completed Project Team Application Form.

The submitting teams should have obtained permission from project clients and other parties for the project to be considered for the Fleming Award prior to submission.

The final of the competition will be held on Tuesday 3rd December 2024 at the ICE. Each team will give a short presentation (20 minutes with 5 minutes questions afterwards). After the presentations have been completed, the judges will retire to consider their verdict. There will be a short keynote lecture while the judges reach their decision. The judges will be selected from members of the BGA Executive Committee, previous winner(s) and industry leaders.

The Prize There is a prize of £1,000, donated by Cementation Skanska.

**Former BGA Chair Professor Stephan Jefferis elected to the Fellowship of the Royal Academy of Engineering (FREng) 19.09.2024**

Congratulations to former BGA Chair Professor Stephan Jefferis on his election to the Fellowship of the Royal Academy of Engineering (FREng)

Professor Stephan Jefferis is a director of Environmental Geotechnics Ltd, a company he established in 1982 anticipating developments in this area. He is a Visiting Professor in the Department of Engineering Science at the University of Oxford.



He is a former Chairman of the BGA and was the 60<sup>th</sup> Rankine Lecturer, presenting in March 2022 on The Unusual and the Unexpected in Geotechnical Engineering: Observation – Analogy – Experiment.

Stephan was a founder director of WJ Groundwater, and has worked on major projects across the World including dams, tunnels, shafts and deep foundations. He has over 45 years experience in the investigation and resolution of unusual and unexpected geotechnical problems, often associated with natural chemical and microbiological processes. He has worked on geotechnical processes including fluid supported excavation for decades and is co-author of the book Polymer Support Fluids in Civil Engineering.

The full list of new Fellows of the Royal Academy of Engineering can be viewed [HERE](#).

## Call for abstracts - 21st ICSMGE Vienna 2026 25.09.2024

The Call for Abstracts is now open for the 21<sup>st</sup> ICSMGE to be held in Vienna in June 2026

Key dates are:

- Abstract submission deadline: 30 November 2024
- Abstract acceptance: 31 March 2025
- Paper submission deadline: 31 July 2025
- Registration opens: 15 October 2025
- Paper acceptance: 31 October 2025
- Final paper upload: 30 November 2025
- Notification oral/poster: 10 February 2026
- End of early bird registration: 15 March 2026

Further details can be found on the conference website [HERE](#).



[www.geoinstitute.org/news](http://www.geoinstitute.org/news)

**2025 Geo-Challenge Student Competitions Now Open for Participation! 19 Sep 2024**



The 2025 National Geo-Challenge Student Competitions will take place on March 3, 2025, during Geotechnical Frontiers 2025 in Louisville, KY. We are excited to invite students to showcase their skills and compete in the following Geo-Challenge competitions:

- [Geo-Wall 2025](#) Competition Director: Dr. Beena Ajmera
- [Geo-Prediction 2025](#) Competition Director: Dr. Matthew Sleep
- [Geo-Poster 2025](#) Co-Directors: Drs. Asif Ahmed and Nancy Ingabire Abayo
- [Geo-Video 2025](#) Competition Director: Dr. Mohammad Yamin
- [Geo-Shirt 2025](#) Competition Director: Dr. Erik Jensen

All the rules for these competitions can also be found on [the GeoWorld Geo-Challenge Group Page](#)

We encourage students to review the rules carefully and begin preparing for the competitions. This is a fantastic opportunity to demonstrate your knowledge, creativity, and teamwork at one of the premier events in geotechnical engineering.

For any questions or additional information, please reach out to the respective competition directors. We look forward to seeing you at the 2025 Geo-Challenge!



### **RIC2025 Introduces The Evert Hoek Legacy Medal**



This prestigious award along with a cash price will honor Dr. Hoek's legacy by recognizing the most outstanding paper at each Rocscience International Conference. Don't miss the **October 15, 2024**, deadline to send in your abstract.

[Submit your abstract](#)

# ΔΙΑΚΡΙΣΕΙΣ ΕΛΛΗΝΩΝ ΓΕΩΤΕΧΝΙΚΩΝ ΜΗΧΑΝΙΚΩΝ



**The Canadian Geotechnical Society  
Rock Mechanics Division**

**Νικόλαος Βλαχόπουλος  
Recipient John A. Franklin Award**



Firstly, I would like to thank the many, many students and members of the [Royal Military College of Canada/Collège militaire royal du Canada](#), RMC Green Team Canadian Military GeoWorks Lab as well as the QGGG for all of their tireless work and dedication with a view to advancing the state of knowledge within this domain; Their efforts are truly appreciated.



I am deeply honored to have been deemed worthy to receive

the prestigious John A. Franklin Award from the Rock Mechanics Division of the [The Canadian Geotechnical Society / La Société canadienne de géotechnique](#).

This award holds a profound significance, as it reflects my diligent, methodical dedication to advancing the state-of-the-art over many, many years and speaks to the impact of the research being conducted by my research team. I extend my heartfelt gratitude to the Canadian Geotechnical Society, as well as to my family, colleagues, and students, who have all been so integral during this ongoing journey.

Thank you as well to those that nominated me and to the selection committee for deeming me worthy of such accolades. Congratulations to all the award winners and to those that are making a difference everyday within our profession(s).

I look forward to continuing to contribute to the rock mechanics and engineering geology / geotechnical fields, collaborating with bright & talented minds, and exploring new frontiers...

Thank you once again for this tremendous honor! Thank you GeoMontreal!



**Γεώργιος Τζωρτζόπουλος  
Runner-up of the Rocha medal 2025**



**Rocha medal 2025:** The Rocha Award Committee selected the winner of the Rocha Medal 2025 and two runners-up.

**Winner:** Lucille Carbillet, FRANCE; Université de Strasbourg, FRANCE.



**Runners-up:** Georgios Tzortzopoulos, GREECE - École Centrale de Nantes, FRANCE

Quan Zhang, CHINA, China University of Mining and Technology, CHINA.

Georgios Tzortzopoulos is currently a Senior Research & Development Structural Engineer at Hellenic Cables in Athens, Greece. Previously, he served as a Technical Support Structural Engineer at Ansys, where he specialized in advanced simulation technologies. He received his PhD (2021) in Fault Mechanics and Earthquake Control from École Centrale de Nantes in France, and his 5-year diploma (2016) in Civil and Structural Engineering from the National Technical University of Athens in Greece.

His expertise lies in robust earthquake control of seismogenic faults, combining analytical, experimental and numerical approaches. He has extensive experience in designing, calibrating, and conducting laboratory experiments to characterize material properties and induce or control dynamic instabilities. He applies advanced Finite Element Analysis (FEA) tools such as ANSYS and Abaqus to simulate complex structural behaviors.

Dr. Tzortzopoulos' doctoral research, conducted as part of the CoQuake Project under the supervision of Prof. Ioannis Stefanou, focused on laboratory-scale fault stimulation techniques to control earthquakes. His work advanced the understanding of fault dynamics and contributed to seismic risk mitigation strategies. This research was supported by the European Research Council (ERC) through the Horizon 2020 program.

Dr. Tzortzopoulos' contributions to the field have earned him international recognition, including the Pierre Londe PhD Prize (2023) and the Ioannis Vardoulakis PhD ALERT Prize (2022).

The international **"2022 Ioannis Vardoulakis PhD Prize"** was awarded to **Dr. Georgios Tzortzopoulos** on September 28th 2022 during the annual ALERT Geomaterials Workshop in Aussois.

Georgios prepared his thesis '*Controlling earthQuakes (CoQuake) in the laboratory using pertinent fault stimulating techniques*' at GeM – Ecole Centrale de Nantes under the supervision of Prof. Ioannis Stefanou and in the frame of the project CoQuake ([www.coquake.eu](http://www.coquake.eu)) funded by the European Research Council.

Based on mathematical developments, numerical analyses and experimental tests, Dr Tzortzopoulos thesis provides, for the first time, **solid scientific evidence for the possibility of preventing earthquakes in the future.**

The Comité Français de Mécanique des Roches (CFMR) awarded the **"Pierre Londe"** thesis prize to **Georgios Tzortzopoulos.**

**Georgios Tzortzopoulos** prepared his thesis '*Controlling earthQuakes (CoQuake) in the laboratory using pertinent fault stimulating techniques*' at GeM – Ecole Centrale de Nantes under the supervision of Ioannis Stefanou and as part of the **ERC CoQuake project** ([www.coquake.eu](http://www.coquake.eu)).

Based on mathematical developments, numerical analyses and experimental tests, Georgios' thesis provides, for the first time, **solid scientific evidence on the possibility of preventing earthquakes in the future.**



*From left to right, George Tzortzopoulos and Philipp Braun, both former PhD students and post-docs in the CoQuake team.*

# ΠΡΟΣΕΧΕΙΣ ΓΕΩΤΕΧΝΙΚΕΣ ΕΚΔΗΛΩΣΕΙΣ

Για τις παλαιότερες καταχωρήσεις περισσότερες πληροφορίες μπορούν να αναζητηθούν στα προηγούμενα τεύχη του «περιοδικού» και στις παρατιθέμενες ιστοσελίδες.

92nd ICOLD Annual Meeting & International Symposium on Dams for People, Water, Environment and Development, 29th September – 3rd October, 2024, New Delhi, India, [www.icold2024.org](http://www.icold2024.org)

The 4th International Symposium on Risk Assessment and Sustainable Stability - Design of Slopes (ISRASSDS-Toronto 2024) September 29–October 4, 2024, Toronto, Canada <http://www.icqdr.com/Home/Detail/87>

5th European Conference on Physical Modelling In Geotechnics, 02 to 04 October 2024, Delft, Netherlands, <https://tc104-issmqe.com/ecpmg-2024>

XVIII African Regional Conference on Soil Mechanics and Geotechnical Engineering, 06 ÷ 09 October 2024, Algiers, Algeria, <https://algeos-dz.com/18ARC.html>

Beyond a Tunnel Vision, October 16th, 2024, Antwerp, Belgium, <https://beyondatunnelvision.eu>

RMCC2023 1st International Rock Mass Classification Conference "Rock Mass Classification meets the Challenges of the 21st Century", 30-31 October 2024, Oslo, Norway, [www.rmcc2024.com](http://www.rmcc2024.com)

CEES2024 1st International Conference on Civil and Environmental Engineering for Resilient, Smart and Sustainable Solutions, 3 - 5 November 2024, AL-Khobar, Saudi Arabia <https://cees2024.org/>

PANAMGEO CHILE 2024 17th Pan-American Conference on Soil Mechanics and Geotechnical Engineering, 12-17 November 2024, La Serena, Chile, <https://panamge-ochile2024.cl>

CouFrac 2024 The 4th International Conference on Coupled Processes in Fractured Geological Media: Observation, Modeling, and Application, November 13-15, 2024, Kyoto, Japan, <https://www.ec-convention.com/coufrac2024/>

3ο Διεθνές Συνέδριο Αρχαίας Ελληνικής και Βυζαντινής Τεχνολογία, 19-20-21 Νοεμβρίου 2024, Αθήνα, [www.edabyt.gr](http://www.edabyt.gr)

ICTG 2024 5th International Conference on Transportation Geotechnics 2024 "Sustainable and Evolving Technologies for Urban Transport Infrastructure", 20 – 22 November 2024, Sydney, Australia [www.ictg2024.com.au](http://www.ictg2024.com.au)

ICOMOS TheoPhilos ISC Conference Authenticity from a European Perspective: 30 Years of the Nara Document on Authenticity November 28-29, 2024, Thessaloniki, Greece, <https://theophilos.icomos.org>

Geotechnics for Sustainable Infrastructure, 28-29 November 2024, Kathmandu, Nepal, <https://geomandu.ngeotechs.org>



## 1st ISRM Commission Conference on Estimation of Rock Mass Strength and Deformability 6 December 2024, Lima, Peru

The Sri Lankan Rock Mechanics and Engineering Society (SLRMES) along with the Peruvian Society of Geoengineering (SPEG) invite you to participate in the First ISRM Commission Conference on Estimation of Rock Mass Strength and Deformability to be held in Lima, Peru on December 6, 2024. The main purpose of the conference is to establish the current status of the procedures available to estimate rock mass strength and deformability.

The conference will cover advances in the areas of rock mechanics and rock engineering encompassing the fields of mining, civil, geological, and petroleum engineering, and geophysics. Each session is expected to start with a Session Lead Lecture given by an expert on the session topic. The technical lectures and trade exhibition programs are organized to provide conference supporters maximum exposure and interaction with participants from universities, industry, government, and exhibitors.



4th Asia-Pacific Conference on Physical Modelling in Geotechnics ACPMG 2024, 11 – 13 December 2024, Abu Dhabi, United Arab Emirates

ROCSCIENCE INTERNATIONAL CONFERENCE 2025, April 6-8, 2025, Sydney, Australia, [www.rocscience.com/events/rocscience-international-conference-2025](http://www.rocscience.com/events/rocscience-international-conference-2025)

PMGEC LEBANON 2025 Pan Mediterranean Geotechnical Engineering Conference 2025, April 28 – 30, 2025, Phoenicia Beirut IHG, Lebanon <https://pmgec-leb.com/>

GEOTECHNICS REIMAGINED, May 21-23, 2025, Bruges, Belgium, <https://dfi-events.org/dfi-effc25>

ISFOF 2025 5th International Symposium on Frontiers in Offshore Geotechnics, June 9-13, 2025, Nantes, France, <https://isfog2025.univ-gustave-eiffel.fr>

World Tunnel Congress 2025 "Tunnelling into a sustainable future – methods and technologies", 9-15 May 2025, Stockholm, Sweden, [www.wtc2025.se](http://www.wtc2025.se)

GeoAsia - 8th Asian Conference on Geosynthetics, 10-13 June 2025, Brisbane, Australia, <https://geoasia8.org>

EGRWSE-2025 6th International Conference on Environmental Geotechnology, Recycled Waste Materials and Sustainable Engineering, June 11-14, 2025, Vigo, Spain, <https://egrwse2025.webs.uvigo.es/>

EUROCK 2025 - ISRM European Rock Mechanics Symposium  
Expanding the underground space - future development of  
the subsurface - an ISRM Regional Symposium, 16-20 June  
2025, Trondheim, Norway, <https://eurock2025.com>

3rd International Conference on Energy Geotechnics - Imple-  
menting the Energy Transition, 17-20 June 2025, Paris,  
France, Kamelia Atefi-Monfared, [catefi@yorku.ca](mailto:catefi@yorku.ca)

6th International Conference GEE2025: Charting the path to-  
ward the future Geotechnical Engineering Education  
July 2-4 2025, Nancy, France, [https://gee2025.sciences-  
conf.org/](https://gee2025.sciences-<br/>conf.org/)

ISGSR2025 9th International Symposium for Geotechnical  
Safety and Risk, 24th – 27th August 2025, Oslo, Norway,  
[www.isgsr2025.com](http://www.isgsr2025.com)

TKZ2025 XXI Technical Dam Control International confer-  
ence, 09-12 September 2025, Chorzów, Poland  
<https://tkz.is.pw.edu.pl/en/>

EUROGEO Technical Challenges and Environmental Impera-  
tives for the 21st Century, 15-18 September 2025, Lille,  
France, <https://eurogeo8.org>

GEOTECH ASIA 2025 - GEOVADIS: The Future of Geotech-  
nical Engineering, October 7th to 10th, 2025, Goa, India,  
<https://www.geotechasia.org>

21st International Conference on Soil Mechanics and Geo-  
technical Engineering Geotechnical Challenges in a  
Changing Environment, 14 – 19 June 2026, Vienna, Austria,  
[www.icsmge2026.org/en](http://www.icsmge2026.org/en)

ISFMG 2026 12th International Symposium on Field Monitor-  
ing in Geomechanics, 06 -10 August 2026, Indian Institute of  
Technology Indore, India,  
<https://sites.google.com/view/isfm2026/home>



### **X Latin American Congress on Rock Mechanics 26 - 28 Aug, 2026, Brsasilia, Brazil**

Contact Person: Marcos Massao Futai, Brazilian Committe of  
Rock Mechanics



### **Eurock 2026 Risk Management in Rock Engineering - an ISRM Regional Symposium 14-19 June 2026, Skopje, Republic North Mace- donia**

Contact Person Name

Prof. Milorad Jovanovski

Email [jovanovski@gf.ukim.edu.mk](mailto:jovanovski@gf.ukim.edu.mk)



### **13th International Conference on Geosynthetics (13 ICG) 13-17 September 2026, Montréal, Canada [www.13icg-montreal.org](http://www.13icg-montreal.org)**

The 13th International Conference on Geosynthetics (ICG) 2026, hosted by the North American Chapter of the International Geosynthetics Society (**IGS-NA**), is themed "Legacy, Evolution & Revolution in Geosynthetics." The theme reflects the many transitions occurring in the field, in our shared responsibility to climate and society, and in how we respond to the challenges and opportunities presented to us by these transitions.



International Symposium Preservation of Monuments & His-  
toric Sitew, 16 – 18 September 2026, Athens, Greece  
<https://tc301-athens.com>



### **6th International Conference on Information Technology in Geo-Engineering JTC2 Conference 13-16 October 2026, Oslo, Norway**

The 6th International Conference on Information Technology in Geo-Engineering (6th ICITG) will be an arena to discuss all topics related to the ongoing digital transformation in Geo-Engineering. Case studies of IT in Geo-Engineering, integration of digital systems (Scan2BIM, BIM2FEM, etc.), benchmark datasets, information modelling, monitoring technology and artificial intelligence are some of the key topics of the 6th ICITG. It is organized under the auspices of the Joint Technical Committee 2 (JTC2) on "Representation of Geo-Engineering Data" of the Federation of International Geo-Engineering Societies (FedIGS).

Contact: Joint Technical Committee 2 (JTC2), Norwegian Geotechnical Institute, Graz University of Technology, [georg.erharter@ngi.no](mailto:georg.erharter@ngi.no)



### **ARMS14 14th Asian Rock Mechanics Symposium -**



**ARMS14, an ISRM Regional Symposium  
22-26 November 2026, Fukuoka, Japan**

Contact Person Name

Yasuhiro Mitani [mitani@doc.kyushu-u.ac.jp](mailto:mitani@doc.kyushu-u.ac.jp)

Telephone +81 92 8023399

Address 744, Motooka, Nishi-ku Fukuoka Japan



**16th International Congress on Rock Mechanics  
Rock Mechanics and Rock Engineering  
Across the Borders  
17-23 October 2027, Seoul, Korea**

**Scope**

The scope of the Congress will cover both conventional and emerging topics in broadly-defined rock mechanics and rock engineering. The themes of the Congress include but not be limited to the following areas:

- Fundamental rock mechanics
- Laboratory and field testing and physical modeling of rock mass
- Analytical and numerical methods in rock mechanics and rock engineering
- Underground excavations in civil and mining engineering
- Slope stability for rock engineering
- Rock mechanics for environmental impact
- Sustainable development for energy and mineral resources
- Petroleum geomechanics
- Rock dynamics
- Coupled processes in rock mass
- Underground storage for petroleum, gas, CO<sub>2</sub> and radioactive waste
- Rock mechanics for renewable energy resources
- Geomechanics for sustainable development of energy and mineral resources
- New frontiers & innovations of rock mechanics
- Artificial Intelligence, IoT, Big data and Mobile (AICBM) applications in rock mechanics
- Smart Mining and Digital Oil field for rock mechanics
- Rock Engineering as an appropriate technology
- Geomechanics and Rock Engineering for Official Development Assistance (ODA) program
- Rock mechanics as an interdisciplinary science and engineering
- Future of rock mechanics and geomechanics

Our motto for the congress is "Rock Mechanics and Rock Engineering Across the Borders". This logo embodies the interdisciplinary nature of rock mechanics and challenges of ISRM across all countries and generations.

# ΕΝΔΙΑΦΕΡΟΝΤΑ - ΣΕΙΣΜΟΙ & ΑΝΤΙΣΕΙΣΜΙΚΗ ΜΗΧΑΝΙΚΗ

<sup>2</sup> Prof. Dr. Naci Görür warned, saying 'it's imminent': 'It could be at least 7.4 – [Sputnik Turkiye](#) – August 31, 2024

([Rishav Kothari](#) / THE WATCHERS, Monday, September 2, 2024, <https://watchers.news/2024/09/02/turkish-geoscientist-warns-of-significant-earthquake-risk-in-bingol-tunceli-and-erzincan>)



## Turkish geoscientist warns of significant earthquake risk in Bingol, Tunceli, and Erzincan

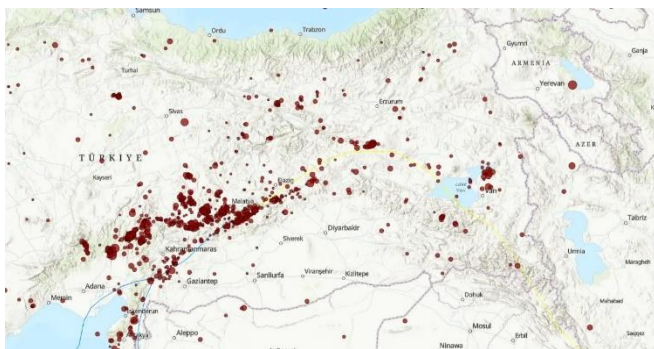


Image credit: TW/SAM, ESRI

**A prominent Turkish geoscientist known for his accurate earthquake predictions issued a new warning concerning an imminent seismic event in Turkey. Speaking on a televised program, Prof. Dr. Naci Gorur detailed the likelihood of a significant earthquake, predicting a magnitude of at least 7.4 in the region spanning Bingol, Tunceli, and Erzincan provinces.**

According to Prof. Gorur, the Yedisu fault line, which lies between Erzincan and Karliova in Bingol, is expected to be the source of this earthquake as the fault line is at a critical point, and the earthquake cycle in the region has stalled, making the event imminent.

"An earthquake over magnitude 7 is likely, and it will be highly destructive," Gorur said, adding that Tunceli is among the areas at risk.

"The governor of Tunceli and the governors of that region took my words seriously. I also spoke to the district governors there. I warned them as much as I could. They are working in Tunceli."

Further elaborating on the situation, Prof. Gorur expressed concern about the area between Karliova and Bingol-Goynuk, indicating that energy transfer from the February 20, 2024, earthquakes may have increased the seismic risk in this region.

He reiterated that the expected earthquake could have a magnitude of at least 7.4 and warned that the affected areas, particularly Tunceli, are at significant risk.

Prof. Gorur's warning is particularly notable due to his history of accurate earthquake predictions, making his latest forecast a matter of significant concern for the residents of Bingol, Tunceli, and Erzincan.

References:

<sup>1</sup> Renowned Turkish expert warns of imminent 7.4 earthquake in three Turkish cities – [Turkiye Today](#) -August 31, 2024

## Weird signal that baffled seismologists traced to mega-landslide in Greenland

**Study of a reverberation that rang around the world reveals a new type of geological event fuelled by global warming.**



Greenland's Dickson Fjord, where last year a 1.2-kilometre-high mountain peak collapsed into the fjord triggering a far-reaching seismic signal. Credit: Jane Rix/Alamy

On 16 September 2023, seismologists worldwide registered a weird signal emanating from eastern Greenland. Missing were the variations in frequency that typically accompany events such as earthquakes: the signal was 'monochromatic', resembling the ringing of a bell, and lasted nine days. It was quickly registered as a UFO, or, USO: an unidentified seismic object.

"It's the first time we've found a seismic signal of this type in the global record: some people thought their sensors were broken," says Kristian Svennevig, a geologist at the Geological Survey of Denmark and Greenland in Copenhagen, who led a study<sup>1</sup> of the event, published on 12 September in *Science*. Far-flung stations registered the signal, including one halfway around the globe in Antarctica.

The event triggered reports of a tsunami at a research station in Greenland's Dickson Fjord, and scientists pinpointed the likely source: a 1.2-kilometre-high mountain peak had collapsed into a gully in the fjord. They now had a culprit, but it remained unclear how a landslide could produce such a long-lasting reverberation. Svennevig and his colleagues assembled an interdisciplinary team to investigate.

Precedents for such seismological signals existed in the scientific literature going back more than a decade. Landslides in closed water basins had produced a back-and-forth sloshing motion, known as a seiche, yielding a monochromatic seismic signature similar to the 2023 one. The difference was that these events were registered only locally and lasted less than an hour.

## Sloshing motion

Svennevig and his colleagues began documenting the landslide and the resulting tsunami. They calculated that the collapse of the mountain top produced a landslide carrying some 25 million cubic metres of material, equivalent to roughly 10,000 Olympic swimming pools. The earthen material smashed into a local glacier at the bottom of a gully, creating a rock-ice avalanche that cascaded sidelong into the fjord.

The initial splash was 200 metres tall, with subsequent waves roughly half that height, Svennevig says. The tsunami was still 4 metres high some 75 kilometres from the initial impact. But what made the event unique was the apparent persistence of the sloshing motion — with waves of roughly 7 metres — that continued between the mountainous sides of the narrow fjord. Using detailed military maps of the floor of the fjord, the team modelled the event, suggesting that the landslide could have produced the mysterious signal.

It's a nice study that explains an "extremely weird and unusual" seismological event, says Göran Ekström, a geophysicist at the Columbia University's Lamont-Doherty Earth Observatory in Palisades, New York. He chalks it up to teamwork and the sharing of data. "The speed at which the team was able to document, describe and explain the sequence of events shows how science can work these days."

In the end, Svennevig and his team suggests that the actual culprit was global warming, which thinned the glacier underpinning the mountain and ultimately set the stage for the landslide. "We will probably see more of these funky events in the future," he says.

doi: <https://doi.org/10.1038/d41586-024-02969-3>

## References

1. Svennevig, K. *et al.* *Science* **385**, adm9247 (2024).

(Jeff Tollefson / *natute NEWS*, 12 September 2024, <https://www.nature.com/articles/d41586-024-02969-3>)

### A rockslide-generated tsunami in a Greenland fjord rang Earth for 9 days

Kristian Svennevig, Stephen P. Hicks, Thomas Forbriger, Thomas Lecocq, Rudolf Widmer-Schmidrig, Anne Mangeney, Clément Hibert, Niels J. Korsgaard, Antoine Lucas, Claudio Satriano, Robert E. Anthony, Aurélien Mordret, Sven Schippkus, Søren Rysgaard, Wieter Boone, Steven J. Gibbons, Kristen L. Cook, Sylfest Glimsdal, Finn Løvholt, Koen Van Noten, Jelle D. Assink, Alexis Marboeuf, Anthony Lomax, Kris Vanneeste, Taka'aki Taira, Matteo Spagnolo, Raphael De Plaen, Paula Koelemeijer, Carl Ebeling, Andrea Cannata, William D. Harcourt, David G. Cornwell, Corentin Caudron, Piero Poli, Pascal Bernard, Eric Larose, Eleonore Stutzmann, Peter H. Voss, Bjorn Lund, Flavio Cannavo, Manuel J. Castro-Díaz, Esteban Chaves, Trine Dahl-Jensen, Nicolas De Pinho Dias, Aline Déprez, Roeland Develter, Douglas Dreger, Láslo G. Evers, Enrique D. Fernández-Nieto, Ana M. G. Ferreira, Gareth Funning, Alice-Agnes Gabriel, Marc Hendrickx, Alan L. Kafka, Marie Keiding, Jeffrey Kerby, Shfaqat A. Khan, Andreas Kjær Dideriksen, Oliver D. Lamb, Tine B. Larsen, Bradley Lipovsky, Ikha Magdalena, Jean-Philippe Malet, Mikkel Myrup, Luis Rivera, Eugenio Ruiz-Castillo, Selina Wetter, and Bastien Wirtz

## Editor's summary

A large rockslide occurred in Greenland on 16 September

2023 that generated a local tsunami. The event was energetic enough to generate a global signal that resonated for 9 days. Svennevig *et al.* used a range of geophysical tools to detail the sequence of events that occurred and then determined the origin of the global signal. The authors found that the signal was generated by standing waves in the Dickson fjord due to the rockslide. Climate change drives feedback among the cryosphere, hydrosphere, and mass wasting events, and signals such as the one the authors observed may provide a different way of understanding these interactions. —Brent Grocholski

## Abstract

Climate change is increasingly predisposing polar regions to large landslides. Tsunamigenic landslides have occurred recently in Greenland (*Kalaallit Nunaat*), but none have been reported from the eastern fjords. In September 2023, we detected the start of a 9-day-long, global 10.88-millihertz (92-second) monochromatic very-long-period (VLP) seismic signal, originating from East Greenland. In this study, we demonstrate how this event started with a glacial thinning-induced rock-ice avalanche of  $25 \times 10^6$  cubic meters plunging into Dickson Fjord, triggering a 200-meter-high tsunami. Simulations show that the tsunami stabilized into a 7-meter-high long-duration seiche with a frequency (11.45 millihertz) and slow amplitude decay that were nearly identical to the seismic signal. An oscillating, fjord-transverse single force with a maximum amplitude of  $5 \times 10^{11}$  newtons reproduced the seismic amplitudes and their radiation pattern relative to the fjord, demonstrating how a seiche directly caused the 9-day-long seismic signal. Our findings highlight how climate change is causing cascading, hazardous feedbacks between the cryosphere, hydrosphere, and lithosphere.

*Science*, 12 Sep 2024, Vol 385, Issue 6714, pp. 1196-1205, DOI: [10.1126/science.adm9247](https://doi.org/10.1126/science.adm9247)

### Greenland landslide caused freak wave that shook Earth for nine days

Seismologists were mystified by a strange signal that persisted for nine days in 2023 – now its source has been identified as a standing wave caused by a landslide in Greenland



Part of a mountain and glacier alongside Dickson Fjord in Greenland in August 2023 (left), and the same spot after a landslide in September 2023  
Søren Rysgaard/Danish Army

On 16 September 2023, seismic monitoring stations around the world detected a strange signal that faded over time but remained detectable for nine days.

"We were like, 'Oh wow, this signal is still coming in. This is



completely different to an earthquake’,” says Stephen Hicks at University College London. “We called it an unidentified seismic object, or USO.”

Hicks and others have now shown that this signal was caused by water sloshing from side to side across the 2.7-kilometre-wide Dickson Fjord in eastern Greenland. This wave was triggered by a massive landslide that resulted in a 110-metre-high tsunami.

Earthquake signals usually last only minutes and are a mix of different frequencies, says Hicks. The USO had a single frequency of around 11 millihertz, meaning it repeated every 90 seconds. Once it became clear that the signal began at the same time as the Greenland landslide, Hicks and his colleagues realised there was probably a connection.

Many objects, such as a bell, will vibrate at a particular resonant frequency if struck. The same is true of bodies of water, from swimming pools to oceans. Disturbances such as earthquakes and winds can set them rocking, generating a kind of standing wave known as a seiche.

Based on its width and depth, the researchers calculated that the resonant frequency of Dickson Fjord is 11 millihertz – matching the signal. What took them much longer to understand is why the fjord kept rocking for so long.

Immediately after the tsunami, the seiche was going up 7 metres on either side of the fjord. Within days, it had gone down to a few centimetres – so small that a Danish naval boat that went up the fjord three days after the landslide didn't notice it.

But the seiche just kept going, and it probably persisted long after the nine days, when it was no longer detectable by distant seismic stations, says Hicks. “No one has ever reported seiches lasting for so long, or dissipating their energy so slowly.”

The shape of the fjord was a crucial factor, computer modelling by the team shows. The landslide site is 200 kilometres inland, with a glacier blocking one end of the fjord and a sharp bend at the other. The round bottom of the fjord also acted a bit like a rocking chair, allowing the water to move with little resistance.

All these factors resulted in a high degree of energy trapping, says Hicks, instead of the wave rapidly dissipating as usual.

The landslide itself was a direct result of climate change. A steep glacier was helping to hold up a mountainside. As the glacier thinned, it gave way, resulting in an estimated 25 million cubic metres of rock and ice falling into the fjord – the first ever landslide recorded in eastern Greenland.

Nobody was in the area at the time, but cruise ships do go up the fjord. The tsunami destroyed equipment being used to monitor the area, along with two abandoned hunting huts.

As the planet keeps warming, there will be more landslides of this kind, says Hicks, who notes that the findings show climate change is now even affecting the earth below us as well as the atmosphere and oceans. “For the first time, we're looking down beneath our feet to see some of the catastrophic impacts of climate change,” he says.

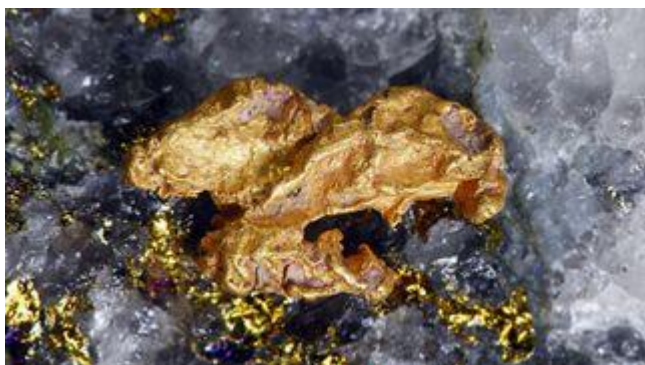
Journal reference: *Science* [DOI: 10.1126/science.adm9247](https://doi.org/10.1126/science.adm9247)

(Michael Le Page / NewScientist, 12 September 2024, <https://www.newscientist.com/article/2447567-greenland-landslide-caused-freak-wave-that-shook-earth-for-nine-days>)

# ΕΝΔΙΑΦΕΡΟΝΤΑ - ΓΕΩΛΟΓΙΑ

## Earthquakes can trigger quartz into forming giant gold nuggets, study finds

Geologists have known for decades that gold forms in quartz with the help of earthquakes, but now they have worked out exactly how the setting and seismic waves combine to form large nuggets.



Gold nuggets form inside quartz veins, which are cracks in the rock infilled with mineral-rich hydrothermal fluids. (Image credit: Henri Koskinen via Alamy)

Scientists have discovered exactly how earthquakes trigger quartz into forming large gold nuggets — finally solving a mystery that's puzzled researchers for decades.

Gold naturally forms in quartz — the second-most abundant mineral in Earth's crust after feldspar. But unlike other types of gold deposits, those found in quartz often cluster into giant nuggets. These nuggets float in the middle of what geologists call quartz veins, which are cracks in quartz-rich rocks that periodically get pumped full of hydrothermal fluids from deep within the crust.

"Gold forms in quartz all the time," said Chris Voisey, a geologist at Monash University in Australia and the lead author of a new study published Monday (Sept. 2) in the journal *Nature Geoscience*. "The thing that's weird is really, really large gold nugget formation. We didn't know how that worked — how you get a large volume of gold to mineralize in one discreet little place," Voisey told *Live Science*.

Hydrothermal fluids carry gold atoms up from the deep and flush them through quartz veins, meaning gold should theoretically become evenly spread in the cracks rather than concentrated into nuggets, Voisey said. These nuggets are exceptionally valuable and represent up to 75% of all the gold ever mined, according to the study.

Two separate clues helped Voisey and his colleagues solve the gold nugget mystery, he said. The first was that the largest nuggets occur in orogenic gold deposits, which are deposits that form during earthquakes. The second was that quartz is a piezoelectric mineral, meaning it creates its own electric charge in response to geologic stress, such as the stress generated by earthquakes.

"When you actually put it together, it almost works out a bit too neat," Voisey said. The researchers found that earthquakes fracture rocks and force hydrothermal fluids up into the quartz veins, filling them with dissolved gold. In response to the stress of the earthquake, quartz veins simultaneously

generate an electric charge that reacts with the gold, causing it to precipitate and solidify.

Gold concentrates in specific spots because "gold dissolved in solution will preferentially deposit onto pre-existing gold grains," Voisey said. "Gold is essentially acting as an electrode for further reactions by adopting the voltage generated by the nearby quartz crystals."

This means that in quartz veins, gold solidifies into clusters that grow bigger with each earthquake. The largest orogenic gold nuggets found to date weigh around 130 pounds (60 kilograms), Voisey said.



In quartz veins, gold preferentially solidifies onto existing gold deposits, forming large clusters of nuggets. (Image credit: Pierre Longnus via Getty Images)

To test this idea, the researchers simulated the effect of an earthquake on quartz crystals in the laboratory. They submerged the crystals in a liquid containing gold and replicated seismic waves to generate a piezoelectric charge. The experiment confirmed that under geologic stress, quartz can produce a large enough voltage to precipitate gold out of solution.

The simulation also confirmed that gold preferentially solidifies on top of existing gold deposits in quartz veins, which helps explain the formation of large gold nuggets.

"Having pre-existing gold and having it become basically the catalyst or the lightning rod that other gold would attach to was very, very exciting," Voisey said.

One of the implications of the study is that scientists can now make large gold nuggets in the lab, "but it's not alchemy," Voisey said. "You'd have to have gold in a solution and then you just move it from basically being in a liquid to sticking to something else."

However, the results don't give geologists and exploration companies new clues as to where to mine for gold nuggets. The best science can offer for now is a device that detects piezoelectric signals from quartz at depth, Voisey said. "This can tell you where quartz veins are — but not tell you if there is gold in those quartz veins."

(Sascha Pare / *LIVESCIENCE*, 2 September 2024, <https://www.livescience.com/planet-earth/geology/earth-quakes-can-trigger-quartz-into-forming-giant-gold-nuggets-study-finds>)



**Ο «θρύλος» της Παρίας Λίθου:  
Τι ήταν ο λυχνίτης**

## Το Παριανό Μάρμαρο και η επίδρασή του στην ιστορία της αρχαίας Ελλάδας



Η Παρία Λίθος

Αν μιλήσει κάποιος στην εποχή μας για τον λυχνίτη, το πιθανότερο είναι ο συνομιλητής του να τον ρωτήσει «μήπως θέλεις να πεις λιγνίτης;» δεδομένου του σημαντικού και ευρέως γνωστού ρόλου του δεύτερου στην ενεργειακή ιστορία της Ελλάδας- ωστόσο ο λυχνίτης, γνωστός και ως **Παρία Λίθος (ή Παριανό Μάρμαρο)** είχε και αυτός τη δική του, διαφορετικής φύσης μεν, εξαιρετικά σημαντική δε, επίδρασή του στην αρχαία ελληνική ιστορία.

### Τα ελληνικά μάρμαρα

Δεν θα ήταν υπερβολικό να ειπωθεί πως χωρίς το ελληνικό μάρμαρο η αρχαία ελληνική τέχνη δεν θα είχε τη μορφή με την οποία τη γνωρίζουμε σήμερα: Η λίθος που «μαρμαίρει» (λαμπυρίζει στον ήλιο) έχει μια διαχρονική πορεία όχι μόνο στην ελληνική, μα και στην παγκόσμια τέχνη, καθώς αποτέλεσε το υλικό από το οποίο φτιάχτηκαν κάποια από τα σημαντικότερα έργα τέχνης της ιστορίας.

Στον ελλαδικό χώρο, η εξόρυξη και η χρήση του μαρμάρου άρχισε από τις Κυκλάδες κατά την προϊστορική εποχή και συνεχίζεται μέχρι σήμερα. Τα ελληνικά μάρμαρα παραμένουν στην κορυφή διεθνώς, με τις επιχειρήσεις που δραστηριοποιούνται στον χώρο να παρουσιάζουν μεγάλη εξωστρέφεια και την πλειονότητα των λατομείων μαρμάρου της Ελλάδας να βρίσκεται στην περιφέρεια Ανατολικής Μακεδονίας- Θράκης.

### Παρία Λίθος- ή αλλιώς, ο λυχνίτης της Πάρου

Ο λυχνίτης Πάρου, ήταν το πολυτιμότερο -και διασημότερο- μάρμαρο της αρχαιότητας, και έμεινε στην ιστορία ως «**Παρία Λίθος**». Κύρια χαρακτηριστικά του είναι το κατάλευκο χρώμα του και η διαφάνειά του, καθώς επιτρέπει στο φως να διεισδύει μέχρι και 25 χιλιοστά. Εμβληματικά έργα γλυπτικής/ αγαλματοποιίας, αλλά και αρχιτεκτονικής, σμιλεύτηκαν από αυτό, από τον 7ο αιώνα πΧ μέχρι και τον 3ο αιώνα μΧ. Όσον αφορά στο όνομά του, προέρχεται από το λυχνάρι, καθώς η εξόρυξή του γινόταν υπογείως, με φωτισμό από λυχνάρια.

Πολλά ήταν τα λατομεία στην Πάρο όπου εξορυσσόταν το πολύτιμο μάρμαρο- τα περισσότερα ήταν στον ορεινό όγκο των Αγίων Πάντων (κατά την αρχαιότητα ήταν γνωστός ως Μάρπησσα). Μεταξύ των κύριων λατομείων στα οποία εξορυσσόταν ήταν τα υπόγεια λατομεία των Νυμφών και του Πανός στο Μαράθι -η στοά των Νυμφών ιδιαίτερα είναι γνωστή για το ανάγλυφο στην είσοδό της, από τον 4ο αιώνα πΧ- αφιέρωμα του Αδάμαντα από τη Θράκη στις Νύμφες. Αξίζει να σημειωθεί πως άλλα σημαντικά λατομεία της αρχαιότητας βρίσκονταν στους Λάκκους, τις Σπηλιές και τα Θαψανά (αν και αυτά ήταν επιφανειακά).

Η χρήση του πιο πολύτιμου μαρμάρου του αρχαίου κόσμου χρονολογείται ήδη από τον 7ο αιώνα πΧ (λέγεται πως οι πρώτοι γλύπτες που το χρησιμοποίησαν ήταν οι Δίπνοις και ο Σκύλλης, μαθητές του θρυλικού Δαιδάλου), με το παριανό

μάρμαρο να κυριαρχεί, παρά τον ανταγωνισμό από άλλα μάρμαρα, όπως το μάρμαρο της Νάξου ή το Πεντελικό- μια κυριαρχία που θεωρείται ότι είχε διάρκεια από τον 6ο αιώνα πΧ μέχρι και τον 2ο και τον 3ο μΧ αιώνα.

Χάρη στο μάρμαρό της, η Πάρος ανέπτυξε μια μεγάλη σχολή γλυπτικής, εξελισσόμενη σε σημαντικότερη εστία καλών τεχνών του αρχαίου κόσμου -σπουδαίοι γλύπτες δημιούργησαν έργα με μάρμαρο της Πάρου, μεταξύ των οποίων ο Σκόπας, ο Θρασυμήδης, ο Αγοράκριτος, ο Αρίστανδρος και άλλοι- ενώ τεράστια ήταν και η συμβολή του μαρμάρου στην οικονομία του νησιού. Γλυπτά φτιαγμένα από λυχνίτη συναντώνταν σε ιερά ανά τον ελλαδικό χώρο και πέρα από τα όριά του, φτάνοντας μέχρι τη βόρεια Αφρική, ενώ μεγάλη ήταν η χρήση του και στην οικοδόμηση ναών. Μεταξύ των εμβληματικότερων έργων τέχνης από λυχνίτη είναι ο Ερμής του Πραξίτελη, η Νίκη της Σαμοθράκης, η Αφροδίτη της Μήλου, ο Θησαυρός των Αθηναίων στους Δελφούς, ο Αύγουστος της Prima Porta και πολλά άλλα.

### Το «Λυχνίτης» του λυχνίτη

Η Παρία Λίθος, το πολυτιμότερο μάρμαρο του αρχαίου κόσμου, δεν θα μπορούσε παρά να ακολουθήσει τη γενικότερη πορεία του: Η εκμετάλλευσή του σταδιακά ατόνησε, πρακτικά σταματώντας επί της βυζαντινής περιόδου- ωστόσο ανέκαμψε για λίγο ξανά κατά την περίοδο της Φραγκοκρατίας, με το μάρμαρο να εξάγεται αλλού στην Ελλάδα και να φτάνει ως τη Βενετία. Ξένες εταιρείες «πήραν τη σκυτάλη» μετά την Ελληνική Επανάσταση: Το 1879 ιδρύθηκε η Βελγική Εταιρεία Μαρμάρων, που αργότερα θα γινόταν η Ελληνική Εταιρεία Μαρμάρων Πάρου, ωστόσο η παραγωγή μαρμάρου δεν θα ήταν ξανά η ίδια, δεδομένου ότι ήδη ο λυχνίτης είχε εξαντληθεί από την αρχαιότητα. Παρόλα αυτά, οι εργασίες εξόρυξης θα συνεχίζονταν σε ένα βαθμό τις επόμενες δεκαετίες, φτάνοντας μέχρι και τα μεταπολεμικά χρόνια- κυρίως σε υπαίθρια λατομεία.

### Φτάνοντας στο σήμερα

Η περιοχή των αρχαίων λατομείων έχει κηρυχθεί αρχαιολογικός χώρος από το 1974, ενώ η περιοχή δυτικά του αρχαίου λατομείου των Νυμφών, που περιλαμβάνει τα λατομεία μαρμάρου του 19ου αιώνα και τις εγκαταστάσεις που σχετίζονταν με αυτά χαρακτηρίστηκε «ιστορικός τόπος» το 2018, κατόπιν πρωτοβουλίας του Δημητρίου Σκιλάρντι, ανασκαφέα των Κουκουναριών- δεδομένου ότι η περιοχή είναι χώρος συνεχούς ανθρωπίνης δραστηριότητας από την αρχαιότητα μέχρι και τους νεότερους χρόνους. Αξίζει να σημειωθεί πως το 2022 ιδρύθηκε η μη κερδοσκοπική οργάνωση «Πάρκο Αρχαίων Λατομείων Μαρμάρου Πάρου ΑΜΚΕ» από έξι παριανά σωματεία, με σκοπό την προστασία και προβολή της ιστορίας και πολιτιστικής κληρονομιάς των λατομείων της Πάρου, τη δημιουργία ενός αρχαιολογικού και πολιτιστικού πάρκου στην περιοχή και, μακροπρόθεσμα, την αναγνώριση των αρχαίων λατομείων ως Μνημείου Παγκόσμιας Κληρονομιάς.

(Επιμέλεια: Κώστας Μαυραγάνης / HuffPost Greece, 18/09/2024, <https://www.huffingtonpost.gr/entry/o-threlos-tes-parias-lithoe-o-lechnites-kai-e-istoria-toe-gr-66e87855e4b06998fbec7ee3>)

### Ο «θρύλος» της Παρίας Λίθου: Ο λυχνίτης και η ιστορία του

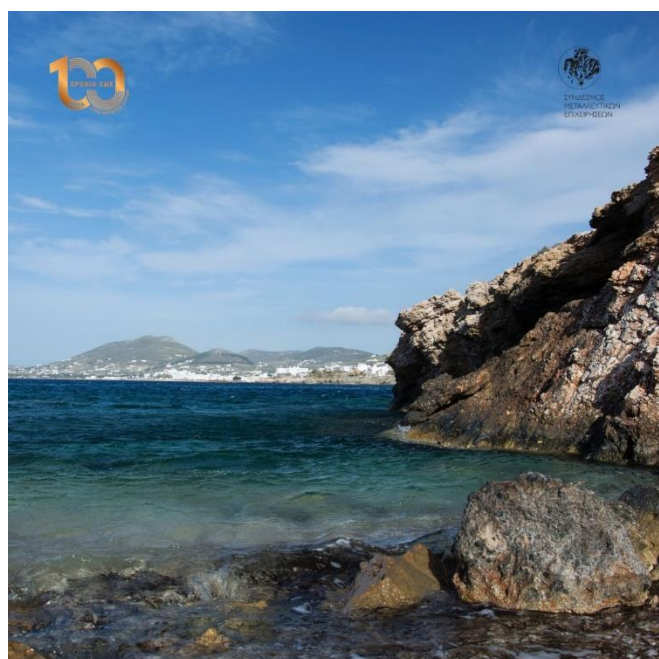
Ας κάνουμε μία αναδρομή στην ιστορία. Ο λυχνίτης Πάρου, ήταν το πολυτιμότερο - και διασημότερο- μάρμαρο της αρχαιότητας, και έμεινε στην ιστορία ως «Παρία Λίθος». Κύρια χαρακτηριστικά του είναι το κατάλευκο χρώμα του και η διαφάνειά του, καθώς επιτρέπει στο φως να διεισδύει μέχρι και 25 χιλιοστά (αντίθετα με άλλα γνωστά μάρμαρα, όπως της Καρράρα και το πεντελικό μάρμαρο, που επιτρέπουν 25 και 15 χιλιοστά αντίστοιχα).



Εμβληματικά έργα γλυπτικής/ αγαματοποιίας, αλλά και αρχιτεκτονικής, σμιλεύτηκαν από αυτό, από τον 7ο αιώνα πΧ μέχρι και τον 3ο αιώνα μΧ. Μεταξύ των εμβληματικότερων έργων τέχνης από λυχνίτη είναι ο Ερμής του Πραξιτέλη, η Νίκη της Σαμοθράκης, η Αφροδίτη της Μήλου, ο Θησαυρός των Αθηνών στους Δελφούς, ο Αύγουστος της Prima Porta και πολλά άλλα.

Πολλά ήταν τα λατομεία στην Πάρο όπου εξορυσσόταν το πολύτιμο μάρμαρο- τα περισσότερα ήταν στον ορεινό όγκο των Αγίων Πάντων (κατά την αρχαιότητα ήταν γνωστός ως Μάρπησσα). Μεταξύ των κύριων λατομείων στα οποία εξορυσσόταν ήταν τα υπόγεια λατομεία των Νυμφών και του Πανός στο Μαράθι.

Δυστυχώς, η εκμετάλλευσή του σταδιακά ατόνησε, πρακτικά σταματώντας επί της βυζαντινής περιόδου- ωστόσο ανέκαμψε για λίγο ξανά κατά την περίοδο της Φραγκοκρατίας, με το μάρμαρο να εξάγεται αλλού στην Ελλάδα και να φτάνει ως τη Βενετία. Παρόλα αυτά, οι εργασίες εξόρυξης θα συνεχίζονταν σε ένα βαθμό τις επόμενες δεκαετίες, φτάνοντας μέχρι και τα μεταπολεμικά χρόνια- κυρίως σε υπαίθρια λατομεία.



Η περιοχή των αρχαίων λατομείων έχει κηρυχθεί αρχαιολογικός χώρος από το 1974, ενώ η περιοχή δυτικά του αρχαίου λατομείου των Νυμφών, που περιλαμβάνει τα λατομεία μάρμαρου του 19ου αιώνα και τις εγκαταστάσεις που σχετίζονταν με αυτά χαρακτηρίστηκε «ιστορικός τόπος» το 2018, κατόπιν πρωτοβουλίας του Δημητρίου Σκιλάρντι, ανασκαφέα των Κουκουναριών- δεδομένου ότι η περιοχή είναι χώρος συνεχούς ανθρώπινης δραστηριότητας από την αρχαιότητα μέχρι και τους νεότερους χρόνους. Αξίζει να σημειωθεί πως το 2022 ιδρύθηκε η μη κερδοσκοπική οργάνωση «Πάρκο Αρχαίων Λατομείων Μαρμάρου Πάρου ΑΜΚΕ» από έξι παριανά σωματεία, με σκοπό την προστασία και προβολή της ιστορίας και πολιτιστικής κληρονομιάς των λατομείων της Πάρου, τη δημιουργία ενός αρχαιολογικού και πολιτιστικού πάρκου στην περιοχή και, μακροπρόθεσμα, την αναγνώριση των αρχαίων λατομείων ως Μνημείου Παγκόσμιας Κληρονομιάς.

[ΣΥΝΔΕΣΜΟΣ ΜΕΤΑΛΛΕΥΤΙΚΩΝ ΕΠΙΧΕΙΡΗΣΕΩΝ ΕΛΛΑΔΑΣ](#)



## Lithospheric 'dripping' occurring beneath Türkiye's Central Anatolian Plateau

**Geoscientists at the University of Toronto, working with Turkish experts, have discovered lithospheric 'dripping' beneath Turkey's Central Anatolian Plateau. This phenomenon occurs when dense parts of the mantle lithosphere descend into the overlying asthenosphere, reshaping the region's surface by deepening the Konya Basin and elevating surrounding places.**

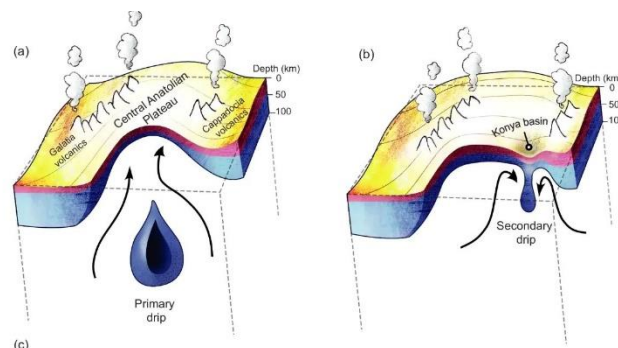


Image credit: Nature/Authors

- Researchers used satellite data and laboratory simulations to explain how the 'dripping' mechanism promotes tectonic shifts, providing insights into planetary geology that might be applied to Mars and Venus.
- The study revealed that this process has occurred across millions of years.

The study discussed lithospheric dripping, in which dense portions of the Earth's mantle lithosphere (the rigid outer layer) separate and drop into the fluid-like asthenosphere below. This produces dramatic changes in surface topography, such as the sinking of the Konya Basin and the elevation of neighboring places.

Over millions of years, this process changed the Central Anatolian Plateau, resulting in its current geological features. The findings also indicated that lithospheric dripping could be a new type of tectonic activity with far-reaching ramifications for planetary geology, including Mars and Venus.

The study focused on Turkey's Central Anatolian Plateau, which is tectonically active and has a complex geological past. The plateau, positioned at the convergence of the Eurasian, Arabian, and African tectonic plates, has seen remarkable changes due to these interactions.

Within this region, the Konya Basin, a vast depression, has been severely impacted by lithospheric leaking and deepening due to subsurface processes. This study explains why the basin collapses despite the adjacent plateau's uplift.

Lithospheric leaking is caused by the instability of the dense lithospheric mantle and the less dense asthenosphere. The mantle lithosphere densifies with time, usually due to chemical changes or cooling. When it can no longer maintain its weight, it seeps into the underlying mantle.

"Looking at the satellite data, we observed a circular feature at the Konya Basin where the crust is subsiding, or the basin is deepening," says lead author Julia Andersen, a Ph.D. candidate in U of T's Department of Earth Sciences in the Faculty of Arts & Science. "This prompted us to look at other geophysical data beneath the surface where we saw a seismic anomaly in the upper mantle and a thickened crust, telling us there is high-density material there and indicating a likely mantle lithospheric drip."

A team of geoscientists led by Julia Andersen, a Ph.D. candidate at the University of Toronto, in collaboration with Istanbul Technical University and Çanakkale Onsekiz Mart University in Türkiye, confirmed the occurrence of this geological process occurring beneath Türkiye's Central Anatolian Plateau.

The work, published in Nature Communications, sheds light on how lithospheric leaking impacts the region's environment and has implications for understanding tectonic processes worldwide.

Following a year of experimental simulations and studies, the drip mechanism has only recently been confirmed. To validate the presence of lithospheric dripping, the research team employed a combination of analog modeling and digital imaging methods. The analog model, built with materials that mimic the Earth's crust and mantle features, enabled scientists to reproduce the process in a laboratory setting.

By scaling these models to represent natural conditions, they could detect drip creation and fall inside the mantle lithosphere. The experiment was continuously observed with high-resolution cameras and particle imaging velocimetry, resulting in exact observations of crustal movements. This novel approach demonstrated that the drip process was a significant driver of geological changes beneath the Central Anatolian Plateau.

"The key conclusion of this work is that basin evolution and plateau uplift may be linked in a multistage process of lithospheric removal within a large-scale orogenic plateau system. Supported by geological, geophysical, and geodetic data, our model results explain the enigmatic active subsidence of the Konya Basin amidst the rising Central Anatolian plateau interior," the researchers concluded.

#### References:

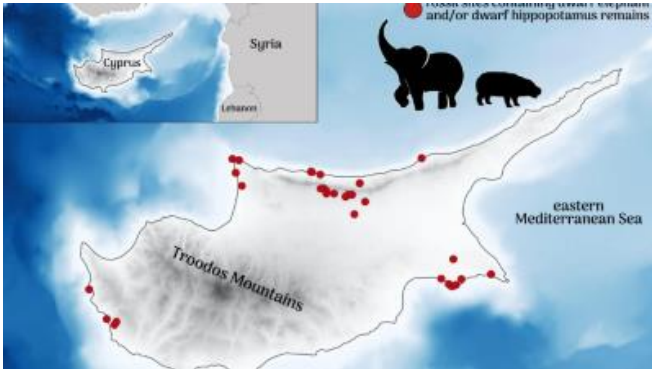
<sup>1</sup> Multistage lithospheric drips control active basin formation within an uplifting orogenic plateau – Andersen, A.J., Göğüş, O.H., Pysklywec, R.N. *et al.* – *Nat Commun* 15, 7899 (2024) – September 13, 2024 – <https://doi.org/10.1038/s41467-024-52126-7> – OPEN ACCESS

(Harsha Borah / THE WATCHERS, Friday, September 20, 2024, <https://watchers.news/2024/09/20/lithospheric-drip-ping-occurring-beneath-turkiyes-central-anatolian-plateau>)

# ΕΝΔΙΑΦΕΡΟΝΤΑ - ΛΟΙΠΑ

## Ξετυλίγοντας ένα αρχαίο ευρωπαϊκό μυστήριο εξαφάνισης

### Η εξαφάνιση της ενδημικής μεγαλοπανίδας στην παλαιολιθική Κύπρο



Επιστήμονες αποκάλυψαν ένα μυστήριο σχετικά με την εξαφάνιση των νάνων ιπποπόταμων και νάνων ελεφάντων που κάποτε περιπλανήθηκαν στο γραφικό τοπίο του μεσογειακού νησιού της Κύπρου πριν εγκατασταθούν εδώ οι πρώτοι άνθρωποι.

Η Κύπρος διαθέτει μόνο δύο είδη μεγαλοπανίδας κατά το Ύστερο Πλειστόκαινο - τον νάνο ελέφαντα περίπου 500 κιλών (*Palaeoloxodon cypriotes*) και τον νάνο ιπποπόταμο περίπου 130 κιλών (*Phanourios minor*), αλλά και τα δύο είδη εξαφανίστηκαν αμέσως μετά την άφιξη των ανθρώπων στο νησί πριν από περίπου 14.000 χρόνια.

Εξετάζοντας τους λόγους πίσω από την εξαφάνιση αυτών των προϊστορικών ζώων, έρευνα που χρηματοδοτήθηκε από το Ευρωπαϊκό Ταμείο Περιφερειακής Ανάπτυξης και την Κυπριακή Δημοκρατία μέσω του Ιδρύματος Έρευνας και Καινοτομίας για το έργο MIGRATE (<https://www.ucy.ac.cy/migrate/>), διαπίστωσε ότι οι παλαιολιθικοί κυνηγοί-τροφοσυλλέκτες στην Κύπρο θα μπορούσαν να έχουν οδηγήσει πρώτα τους νάνους ιπποπόταμους και έπειτα τους νάνους ελέφαντες στην εξαφάνιση σε λιγότερο από 1.000 χρόνια. Επικεφαλής της έρευνας ήταν ο καθηγητής Corey Bradshaw του Πανεπιστημίου Flinders (Αυστραλία).

Αυτά τα ευρήματα αντικρούουν προηγούμενες υποθέσεις που υποστήριζαν ότι η εισαγωγή ενός μικρού πληθυσμού ανθρώπων στο νησί δεν θα μπορούσε να είχε προκαλέσει αυτές τις εξαφανίσεις τόσο γρήγορα.

Οι ερευνητές έφτιαξαν μαθηματικά μοντέλα που συνδυάζουν δεδομένα από διάφορους κλάδους, συμπεριλαμβανομένης της παλαιοντολογίας και της αρχαιολογίας, για να διερευνήσουν κατά πόσο οι παλαιολιθικοί κυνηγοί-τροφοσυλλέκτες στην Κύπρο είναι η πιο πιθανή αιτία εξαφάνισης αυτών των ειδών λόγω των κυνηγετικών πρακτικών τους.

Ο καθηγητής Bradshaw, με τους Δρς. Θεοδώρα Μούτσιου, Christian Reepmeyer, Frédéric Saltré και Stefani Crabtree, χρησιμοποίησαν προσεγγίσεις βάσει δεδομένων για να μελετήσουν τον αντίκτυπο της ταχείας ανθρώπινης εγκατάστασης στην εξαφάνιση των ειδών σε τόσο σύντομο χρονικό διάστημα μετά την άφιξή τους στο νησί.

Χρησιμοποιώντας λεπτομερείς ανακατασκευές των ανθρώπινων ενεργειακών απαιτήσεων, της σύνθεσης της διατροφής,

της επιλογής θηραμάτων και της αποτελεσματικότητας του κυνηγιού, το μοντέλο καταδεικνύει ότι οι 3.000-7.000 κυνηγοί-τροφοσυλλέκτες που προβλέπεται πως πιθανώς βρίσκονταν στο νησί την περίοδο ενδιαφέροντος ενδεχομένως ήταν υπεύθυνοι για την εξαφάνιση και των δύο ειδών μεγαλοπανίδας.

«Τα αποτελέσματά μας επομένως παρέχουν ισχυρές ενδείξεις ότι οι πρώιμοι πληθυσμοί στην Κύπρο ήταν τουλάχιστον εν μέρει υπεύθυνοι για τις εξαφανίσεις της μεγαλοπανίδας κατά το Ύστερο Πλειστόκαινο και το πρώιμο Ολόκαινο. Ο καθοριστικός παράγοντας του κινδύνου εξαφάνισης και για τα δύο είδη ήταν η αναλογία βρώσιμου κρέατος που παρείχαν στους πρώτους ανθρώπους στο νησί», λέει ο επικεφαλής συγγραφέας, καθηγητής Corey Bradshaw του Πανεπιστημίου Flinders.

«Η έρευνά μας θέτει τα θεμέλια για μια βελτιωμένη κατανόηση του αντίκτυπου που μπορούν να έχουν οι μικροί πληθυσμοί ανθρώπων όσον αφορά τη διατάραξη των εγγενών οικοσυστημάτων και την πρόκληση μεγάλων εξαφανίσεων ακόμη και σε μια περίοδο χαμηλής τεχνολογικής ικανότητας».

Οι προβλέψεις του μοντέλου συνάδουν με την χρονολογική ακολουθία των εξαφανίσεων της μεγαλοπανίδας όπως προκύπτει από διαθέσιμα παλαιοντολογικά δεδομένα.

Η Δρ Μούτσιου λέει ότι «η Κύπρος είναι η τέλεια τοποθεσία για να δοκιμάσουμε τα μοντέλα μας γιατί το νησί προσφέρει ένα ιδανικό σύνολο συνθηκών για να εξετάσουμε κατά πόσο η άφιξη πληθυσμών ανθρώπων οδήγησε τελικά στην εξαφάνιση της μεγαλοπανίδας. Αυτό συμβαίνει διότι η Κύπρος είναι ένα νησιωτικό περιβάλλον και μπορεί να προσφέρει ένα παράθυρο πίσω στο χρόνο μέσω των δεδομένων μας».

Προηγούμενα ευρήματα του καθηγητή Bradshaw, της Δρ Μούτσιου και των συνεργατών τους έδειξαν ότι μεγάλες ομάδες εκατοντάδων έως χιλιάδων ανθρώπων θα μπορούσαν να είχαν φτάσει στην Κύπρο σε δύο έως τρία κύρια μεταναστευτικά γεγονότα σε λιγότερο από 1.000 χρόνια.

Η έρευνα με τίτλο, «Μικροί πληθυσμοί παλαιολιθικών ανθρώπων στην Κύπρο κυνηγούσαν την ενδημική μεγαλοπανίδα μέχρι την εξαφάνιση» των Corey Bradshaw, Frédéric Saltré, Stefani Crabtree, Christian Reepmeyer και Θεοδώρας Μούτσιου δημοσιεύτηκε στο *Proceedings of the Royal Society B* 291: 20240967. doi:10.1098/rspb.2024.0967 Το έργο *Modelling Demography and Adaptation in the Initial Peopling of the Eastern Mediterranean Islandscape* (MIGRATE, EXCELLENCE/0421/0050) συντονίζεται από τη Δρ Θεοδώρα Μούτσιου στην Ερευνητική Μονάδα Αρχαιολογίας του Πανεπιστημίου Κύπρου.

Περισσότερες πληροφορίες: Professor Corey Bradshaw, Matthew Flinders Professor of Global Ecology, College of Science and Engineering, Flinders University, Email: [corey.bradshaw@flinders.edu.au](mailto:corey.bradshaw@flinders.edu.au) και Δρ Θεοδώρα Μούτσιου, Ερευνητική Μονάδα Αρχαιολογίας, Πανεπιστήμιο Κύπρου, Email: [tmouts01@ucy.ac.cy](mailto:tmouts01@ucy.ac.cy).

([University of Cyprus](https://www.ucy.ac.cy), September 19, 2024)



# ΤΑΞΙΔΙΩΤΙΚΕΣ ΕΝΤΥΠΩΣΕΙΣ

## Σκέφτηκα στο Τολέδο

Αποστόλης ΡΙΤΣΟΣ<sup>(3)</sup>,  
σε συνεργασία με  
Rafael MONEO<sup>(1)</sup>, Carla BOVIO<sup>(2)</sup>

### 1. Εισαγωγή

"... Τριάντα επτά χρόνια κούρνιαζες απάνω στο βράχο τούτου του Τολέδου, τριάντα επτά χρόνια θα πρόβαινες από το λιακωτό όπου τώρα στέκουμαι και θα κοιτάζες το λασπερό Τάγο, που κυλούσε κάτω από το διπλοδόξαρο γιοφύρι Αλκάνταρα, να φεύγει, να πηγαίνει να χυθεί και να χαθεί στη θάλασσα. Κυλούσε και ο νους σου μαζί του, κυλούσε κι η ζωή σου ... "

### 2. Ποταμοί

Από το Φόδελε, Χάνδακα (Ηράκλειο Κρήτης) και τα ποτάμια Αλμυρό, Γαζανό, Γιόφυρο ή Διακονιάρη; στη Βενετία και το Μεγάλο Κανάλι/GrandCanal; στη Ρώμη και τον Τίβερη/Tiber; στη Μαδρίτη και στο Μανθανάρες/Rio Manzanares; τελικά στο Τολέδο και στον ποταμό Τάγο/Tagus/Tajo.

### 3. Τολέδο

Η ιστορική πόλη έχει κτιστεί πάνω στο βράχο, που σα νησίδα ξεχωρίζει στην περιοχή αυτή και είναι ηλιοφώτιστη στο μπλε Καστιλιάνικο ουρανό.

Είναι χτισμένη πάνω σε ένα τραχύ ακρωτήριο από βραχώδεις σχηματισμούς, που βρέχεται στις τρεις πλευρές του, από τα νερά του ποταμού Τάγου, που ρέει σε όλη τη διαδρομή από το Puente de Alcántara, τη γέφυρα Alcántara, έως το Puente de San Martín.

Δύο γέφυρες διασχίζουν τον ποταμό Τάγο. Στα βορειοανατολικά βρίσκεται η γέφυρα Alcántara, στους πρόποδες του μεσαιωνικού κάστρου του San Servando, τμήματα του οποίου χρονολογούνται από τη ρωμαϊκή και τη μαυριτανική εποχή. Στα βορειοδυτικά βρίσκεται η γέφυρα του San Martín, που χρονολογείται από τα τέλη του 13ου αιώνα.

Το όνομα της πόλης, προέρχεται από τη λατινική λέξη Toletum, δηλαδή πόλη με τείχη. Αναφέρεται από τον Ρωμαίο ιστορικό Τίτο Λίβιο (Titus Livius, 59π.Χ.-17μ.Χ.) ως "urbisparva, sedlocomunita", δηλαδή "μια μικρή πόλη, αλλά ένα οχυρό μέρος", φυσικά οχυρωμένη από την τοποθεσία και τη μορφολογία του φυσικού αναγλύφου. Μια πόλη χτισμένη ψηλά.

Τμήματα των τειχών του Τολέδο είναι Βησιγοθικής προέλευσης, αν και τα περισσότερα είναι Μαυριτανά ή Χριστιανικά. Τα τείχη της πόλης, που ανεγέρθηκαν κατά τη ρωμαϊκή εποχή, ανακατασκευάστηκαν και έδωσαν τη σημερινή τους εμφάνιση από τους Άραβες.

(1) RAFAEL MONEO, Arquitecto. Pritzker Prize in Architecture (1996), the Royal Gold Medal of the Royal Institute of British Architects (2003), the Prince of Asturias Prize in the Arts (2012), the National Spanish Architecture Prize (2015), the Praemium Imperiale of Japan (2017), and much more ...

(2) CARLA BOVIO, Arquitecta. Architect en Estudio Rafael Moneo

(3) Α. ΡΙΤΣΟΣ, Πολιτικός Μηχανικός Ε.Μ.Π. / Α. ΡΙΤΣΟΣ Civil Engineer N.T.U.A. Ευχαριστίες για τη συμμετοχή στη σύνταξη του άρθρου, στην Κα Α. Λάβδα.

Το Τολέδο υπήρξε πρωτεύουσα της Ισπανίας (1085-1559). Είναι μνημείο της παγκόσμιας πολιτιστικής κληρονομιάς της UNESCO (1986) και είναι ισχυρό θρησκευτικό και πολιτιστικό κέντρο. Μια πόλη μουσείο της ιστορίας, της τέχνης και της αρχιτεκτονικής. Εδώ μεταφράστηκαν πολλά από τα συγγράμματα της αρχαίας Ελληνικής γραμματείας, από τα αραβικά, στα λατινικά.

Υπάρχουν καλοδιατηρημένες πύλες στα τείχη, συμπεριλαμβανομένης της Puerta Vieja de Bisagra (10ος αιώνας), που παραδοσιακά χρησιμοποιήθηκε από τον Alfonso VI το 1085.

Μέσα στα τείχη της πόλης, η δόμηση είναι πυκνή, με δαιδαλώδη, ελικοειδή, στενά σοκάκια, με επίκεντρο την Plaza del Zocodover.

Γνωστά είναι τα δαμασκηνά σπαθιά που κατασκευάζονταν εδώ, με μαύρο ασάλι, με νήμα από χρυσό, ασήμι, χαλκό. Τοπικό γαστρονομικό έδεσμα είναι η κοκκινιστή πέρδικα και η αμυγδαλόπαστα.

### 4. τα τρία "γεω"

Στο Τολέδο, αναζήτησα τα τρία "γεω" που μαζί υνυπάρχουν: γεωμετρία, γεωλογία, γεωτεχνία.

### 5. γεωλογία

Στην περιοχή όπου έχει χτιστεί το Τολέδο συγκλίνουν τρεις κύριες γεωλογικές ενότητες. Τα πυριγενή πετρώματα και τα παλαιότερα μεταμορφωμένα πετρώματα; η περιοχή ήταν παραδοσιακά γνωστή ως πυριτική Ισπανία. Τα ιζηματογενή πετρώματα Μεσοζωικής ηλικίας; η περιοχή ήταν παραδοσιακά γνωστή σαν την ασβεστολιθική Ισπανία. Τα ιζηματογενή Καινοζωικής εποχής; η περιοχή ήταν παραδοσιακά γνωστή ως αργιλώδης Ισπανία.

Βραχώδεις είναι οι σχηματισμοί που κυρίως συναντώνται στο ύψωμα, στη χερσόνησο, που κατασκευάστηκε η ιστορική πόλη του Τολέδο.

Υπερτερούν τα Πυριγενή Πετρώματα, ο Γάββρος, οι Γρανοδιορίτες, οι Γνεύσιοι και οι Γρανίτες, των οποίων η μάζα διασχίζεται από διαφορετικά πετρώματα.

Σχετικά με τον ποταμό Τάγο, διάβασα πως υπάρχουν διάφορες θεωρίες που σχετίζονται διαχρονικά με τις θέσεις ροής του. Ο ποταμός, δε διέρχεται από τους μαλακούς Τριτογενείς και Τεταρτογενείς σχηματισμούς, αλλά διέρχεται από σκληρά μεταμορφωμένα και πυριγενή πετρώματα, ενδεχομένως λόγω τεκτονικών συνθηκών.

### 6. γεωμετρία

Τα Τεχνικά Έργα στην Ισπανία, έχουν σαφήνεια, έχουν αντοχή, είναι λειτουργικά, είναι χρηστικά για το λόγο που κατασκευάστηκαν και χρειάζονται την ελάχιστη δυνατή συντήρηση, διότι τα σέβονται όλοι, αυτοί που είχαν τη σύλληψη του έργου, οι μελετητές, οι κατασκευαστές, αλλά κυρίως τα σέβονται αυτοί που τα χρησιμοποιούν.

Επισκέφτηκα στο Τολέδο, το Συνεδριακό Κέντρο: Palacio de Congresos en Toledo.

Αρχιτέκτων του έργου είναι ο Rafael Moneo.

Ο Rafael Moneo, συνέλαβε την ιδέα της γεωμετρίας και της κατασκευής ενός φιλόδοξου Συνεδριακού Κέντρου, σε αντίθεση με την αρχική πρόταση των Πολεοδόμων, που είχαν προτείνει να κατασκευαστεί εκεί πολυώροφο κτίριο στάθμευσης, για τη διευκόλυνση της πόλης και των επισκεπτών της. Παλαιότερες μικρότερες κατασκευές που υπήρχαν εκεί καταφίσησαν.

Το Δημαρχείο την πόλη, αποδέχτηκε την πρότασή του.

Στο Βόρειο – Βορειοανατολικό άκρο της ιστορικής πόλης, κατασκευάστηκε το Συνεδριακό Κέντρο, το διάστημα 2000-2010. Εγκαινία έγιναν το Σεπτέμβριο του 2012.

Το έργο βρίσκεται στην περίμετρο της ιστορικής πόλης, εντός των τειχών της, στα πρανή του υψώματος.

Περιλαμβάνει, στους ανώτερους τρεις ορόφους ένα άνετο αμφιθέατρο 1000 ατόμων, αίθουσα δεξιώσεων και τις υπηρεσίες που απαιτούνται για ένα Συνεδριακό Κέντρο, στους κατώτερους ορόφους υπάρχει χώρος στάθμευσης για 650 αυτοκίνητα. Η χωροθέτηση και η γεωμετρία της κατασκευής, συνδυάζει σημεία θέασης προς τα πεδινά, προς τους μαιανδρισμούς του ποταμού Τάγου, μια βεράντα και κήπο με πρόσβαση, μέσω μιας μικρής πλατείας δίπλα στο Calle de las Armas, προς τη Plaza de Zocodover.

Η επιλογή των υλικών και των χρωμάτων, που είναι κυρίως με τη χροιά της ώχρας, συνδυάζονται οπτικά με παλαιότερες γειτονικές κατασκευές και κτίρια της ιστορικής πόλης, όπως και με τα τείχη.

Για την κυκλοφορία και τη πρόσβαση επισκεπτών, αλλά και για την κίνηση προς την πόλη, υπάρχουν δύο κατακόρυφα συστήματα επικοινωνίας και κυλιόμενες σκάλες, που συγκλίνουν στη βόρεια πρόσοψη, ενώ δίνουν πρόσβαση επίσης και προς το κέντρο της πόλης, από το La Antequeruela και το σταθμό των τραινών. Εξωτερικά τα στοιχεία αυτά είναι καλαίσθητα και εντάσσονται πλήρως στην οπτική του τοπίου.

ΚΥΡΙΟΣ ΕΡΓΟΥ Toledo EMV Infrastructure.

ΑΡΧΙΤΕΚΤΩΝ Rafael Moneo.

ΟΜΑΔΑ ΕΡΓΟΥ

Αρχιτέκτονας Έργου: Oliver Bieniussa

Ομάδα συνεργασίας:

Julie Hui-Guang Kaufman (Αρχιτέκτονας)

Fernando Iznaola (Αρχιτέκτονας)

Edgar Sarlie (Αρχιτέκτονας)

Dirk Schluppkotten (Αρχιτέκτονας)

Vidal Gutiérrez de Sande (Επιθ. ποσότητας)

Gonzalo Romero (Επιθ. ποσότητας)

Francisco González Peiró (Επιθ. ποσότητας)

ΣΥΝΕΡΓΑΤΕΣ

ΣΤΑΤΙΚΑ NB 35 Jesús Jiménez Cañas

ΜΗΧΑΝΟΛΟΓΟΣ ΜΗΧΑΝΙΚΟΣ Rafael Úrculo- R. Urculo Ingenieros Consultores

ΑΚΟΥΣΤΙΚΗ ΧΩΡΟΥ Higiní Arau

ΦΩΤΟΓΡΑΦΟΣ ΕΡΓΟΥ Duccio Malagamba

ΚΑΤΑΣΚΕΥΑΣΤΗΣ Acciona

ΠΡΟΫΠΟΛΟΓΙΣΜΟΣ 46.000.000 €

ΕΠΙΦΑΝΕΙΑ 37.000 m<sup>2</sup>

## 7. γεωτεχνία

Για την κατασκευή, πραγματοποιήθηκε κατακόρυφη εκσκαφή, της τάξεως των 40m, στη βάση των αρχαίων τειχών της πόλης και του ιστορικού οικιστικού κέντρου.

Η νέα κατασκευή, λειτουργεί τελικά και σαν αντιστήριξη της βραχώμαζας και του φυσικού αναγλύφου.

Από φωτογραφίες κατά την κατασκευή, φαίνονται τοπικές αντιστηρίξεις και μικρής κλίμακας προ-ενισχύσεις και στερεώσεις της βραχώμαζας.

## 8. αρμονία

“... κάθε άρτιος άνθρωπος έχει μέσα του, στην καρδιά της καρ-

διάς του, ένα κέντρο μουσικό και γύρα του περιστρέφονται τα πάντα; ο μουσικός αυτός στρόβιλος δίνει ενότητα στο στοχασμό και στην πράξη μας και μας βοηθάει να βρούμε ή να εφεύρουμε, την αρμονία του κόσμου...” [1]

## 9. Ο Καλλιτέχνης, αγαπημένη παπού

Αρχικά αγιογράφος, ζωγράφος, γλύπτης και αρχιτέκτονας της Ισπανικής Αναγέννησης, πρόδρομος του εξπρεσιονισμού και της μοντέρνας τέχνης. Αξιοποίησε στοιχεία της Ανατολικής και Δυτικής παράδοσης. Συνδυάζει Ιταλικό και Ισπανικό Μανιερισμό, τηρώντας παράλληλα και τους νόμους της βυζαντινής ζωγραφικής.

Επειδή ήταν Ελεύθερος Επαγγελματίας, είχε εξαιρεθεί από τη φορολογία.

Στα έργα του έκανε χρήση ζωντανών χρωμάτων. Εφαρμόζει αρχές της προοπτικής και απεικόνισε τα θέματά του με ιδιότυπο χειρισμό του φωτός, ώστε να υπάρχει η αίσθηση του τριδιάστατου φωτός.

Ψηλόλιγνες μορφές, σα να στροβιλίζονται, αποτελούσαν το κοινό χαρακτηριστικό των Μανιεριστών ζωγράφων.

Ο στροβιλισμός στη ζωγραφική, δίνει την αίσθηση της κίνησης, δίνει το λόγο, δηλαδή τη δυνατότητα περιγραφής του θέματος, επικροτεί την έκφραση και το συναίσθημα.

Ο Πάμπλο Πικάσσο τον αποκαλούσε «πατέρα». Αποτέλεσε εμπνευστή του για τα έργα του, που συνολικά εντάσσονται στη μπλε περίοδο.

## 10. Επίλογος

Επισκέφτηκα στο Τολέδο, το Συνεδριακό Κέντρο: Palacio de Congresos en Toledo.

## Ο Καλλιτέχνης

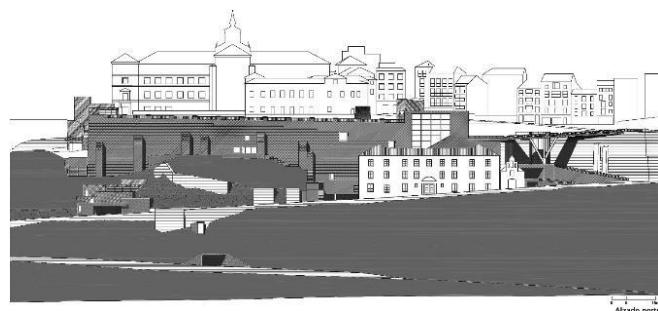
Για κάποιους λεγόταν, **Ντομίνικο Τεχοκόπουλος**.

Για κάποιους άλλους, **Δομίνικο Θεοτοκόπουλος**.

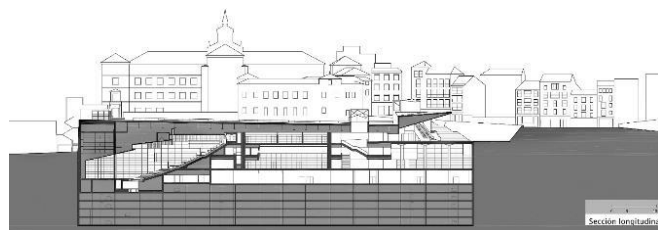
Για όλους μας, ήταν ο **“El Greco”**.

Το Συνεδριακό Κέντρο, Palacio de Congresos en Toledo, ονομάστηκε “El Greco”.

## A. ΣΧΕΔΙΑ © Rafael MONEO



[A1]. Όψη προς Βορρά του Συνεδριακού Κέντρου και της ιστορικής πόλης.



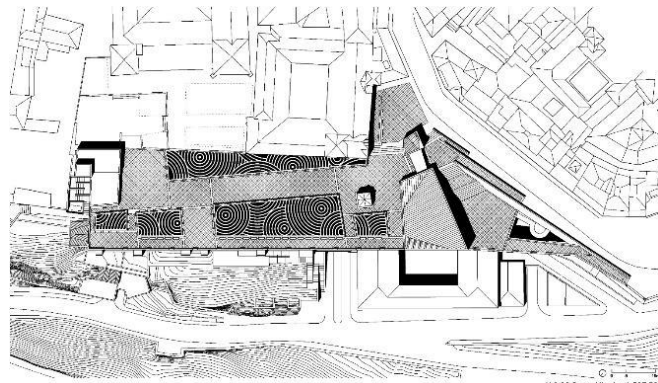
[A2]. Κατά μήκος τομή Ανατολή-Δύση, στο θέση του αμφιθέατρου.





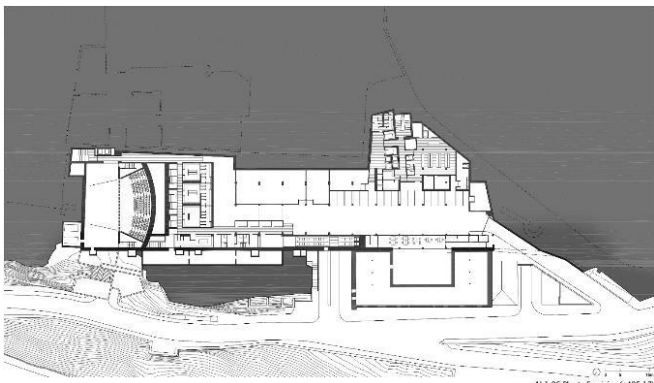
AI-1.01 Planta Parking (+481,50)

[A3]. Κάτοψη στο κατώτερο επίπεδο +481,50m. Χώρος στάθμευσης αυτοκινήτων.



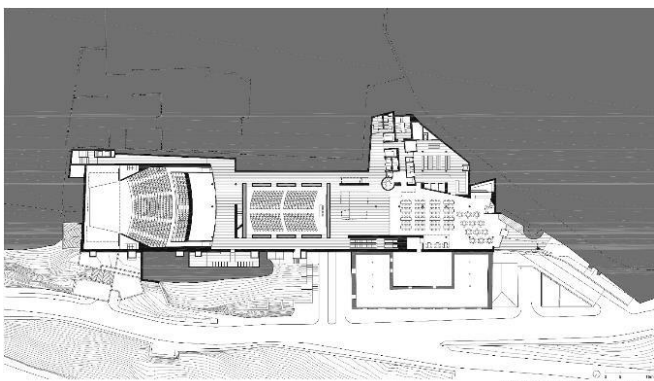
AI-1.11 Paseo Miraflores (+517,50)

[A7]. Κάτοψη στο ανώτερο επίπεδο +517,50m. Σύνδεση με την ιστορική πόλη.



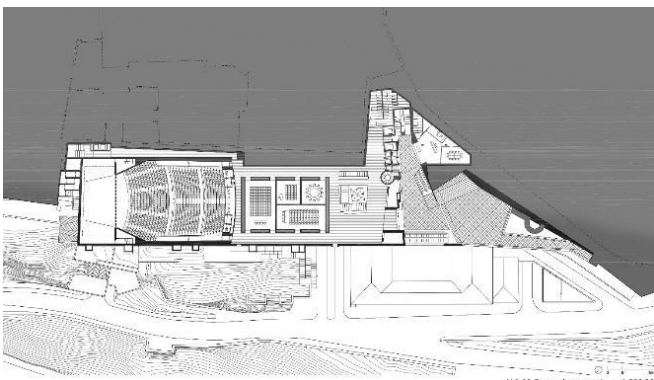
AI-1.06 Planta Services (+495,17)

[A4]. Κάτοψη στο επίπεδο +495,17m. Κύριος χώρος του Αμφιθεάτρου.



AI-1.07 Centro de convenciones (+500,10)

[A5]. Κάτοψη στο επίπεδο +500,10m. Κύριος χώρος του Αμφιθεάτρου και των αιθουσών συνεδριάσεων.



AI-1.09 Centro de convenciones (+509,30)

[A6]. Κάτοψη στο επίπεδο +509,30m. Κύριος χώρος του Αμφιθεάτρου και των αιθουσών συνεδριάσεων.

## Β. ΤΟΠΙΟΓΡΑΦΙΕΣ

{ύστερη περίοδος Καλλιτέχνης}



Η πόλη του Τολέδο, στις λίγες τοπιογραφίες που έχει ζωγραφίσει ο Καλλιτέχνης, έχει συμβολικά αποτυπωθεί σε τρεις μόνο πίνακες.



[B1]. "Το Τολέδο στην καταιγίδα", 1596-1600, ελαιογραφία σε πανί, Μητροπολιτικό Μουσείο Τέχνης, Νέα Υόρκη. Στον πίνακα παρουσιάζεται μόνον το ανατολικό τμήμα της πόλης. Προκειμένου να ικανοποιηθούν οι ανάγκες στη σύνθεση του έργου, υπάρχει τροποποίηση στην πραγματική θέση κτιρίων, έτσι ώστε να μην υπάρχει εστίαση στην ακρίβεια της τοπιογραφίας, αλλά κυρίως στη δραματοποίησή της.





[B2]. "Άποψη της Χάρτης του Τολέδο", 1608, λάδι σε καμβά, Μουσείο El Greco, Τολέδο. Ο πίνακας δείχνει μία περισσότερο συμβολική, παρά πιστή απεικόνιση της πόλης του Τολέδο, μόνο με κύρια σύγχρονα κτίρια εκείνης της εποχής, όπως το Alcázar, η Puerta Nueva de Bisagra και το Hospital de Tavera, που κυριαρχεί σε ολόκληρη την ομάδα των μνημείων.



[B3]. "Λασκόων", 1610-1614, λάδι σε καμβά, Εθνική Πινακοθήκη Τέχνης, Ουάσιγκτον, D.C. Ο πίνακας αντιπροσωπεύει την επιρροή τόσο της κλασικής μυθολογίας όσο και της τέχνης και απεικονίζει ένα βίαιο ελληνικό μύθο σαν να είχε λάβει χώρα στην πόλη του Τολέδο. Παράλληλα, όπως ο ποταμός Τάγος περιβάλλει το ύψωμα, έτσι και στον πίνακα οι ανθρώπινες μορφές, περιβάλλουν τη πόλη.

### C. ΑΕΡΟΦΩΤΟΓΡΑΦΙΕΣ

{google earth} GPS: 39.860198974609375, -4.021059989929199



[C1]. Γενική άποψη του Τολέδο και του ποταμού Τάγου.



[C2]. Γενική άποψη της ιστορική πόλης. Ο ποταμός Τάγος, ρέει στις τρεις πλευρές, γύρω από το βραχώδες ύψωμα. Η θέση του Συνεδριακού Κέντρου είναι στο Βόρειο, Βόρειο Ανατολικό τμήμα της πόλης.

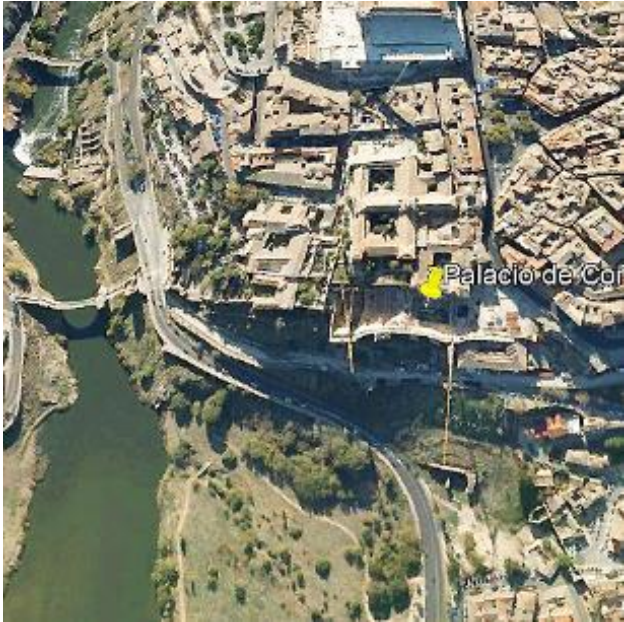


[C3]. Τολέδο. Η θέση του Συνεδριακού Κέντρου είναι στο Βόρειο, Βόρειο Ανατολικό τμήμα της πόλης.



[C4]. Τολέδο. Η θέση του Συνεδριακού Κέντρου είναι στο Βόρειο, Βόρειο Ανατολικό τμήμα της ιστορικής πόλης (έχει γίνει περιστροφή, ο Βορράς είναι προς τα κάτω).





[C5]. Τολέδο. Θέση Συνεδριακού Κέντρου (κατασκευή 2000-2010) στο Βόρειο, Βόρειο Ανατολικό τμήμα της πόλης (googleearth2007).

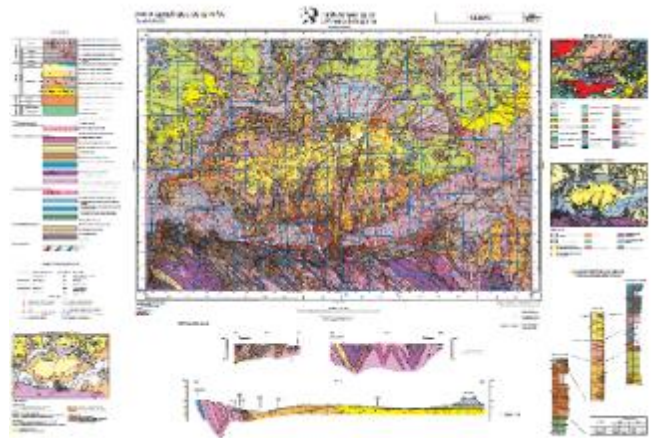


[C8]. Πλευρική αεροφωτογραφία του Τολέδο (1923, Gómez de Llarena, 1923).



[C6]. Τολέδο. Θέση Συνεδριακού Κέντρου (googleearth2024), εντός των τειχών, στην περίμετρο του αστικού ιστού. Πλήρως διακριτική η προσαρμογή και η ένταξη του έργου στο φυσικό ανάγλυφο.

#### D. ΓΕΩΛΟΓΙΚΟΙ ΧΑΡΤΕΣ

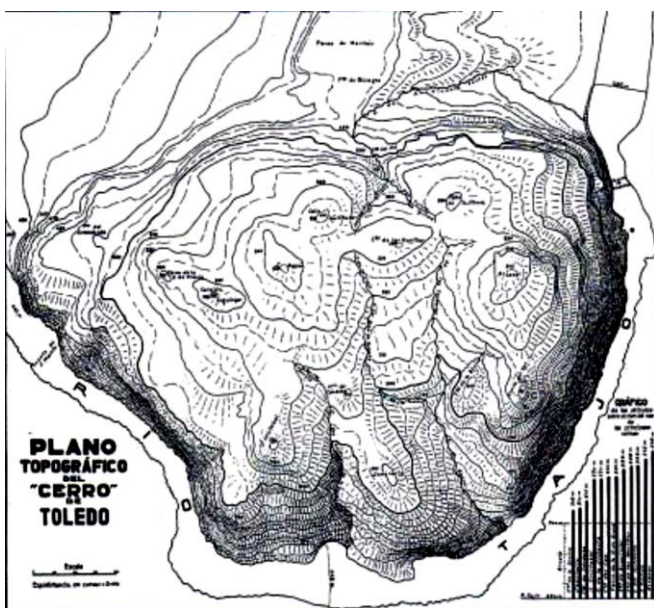


Γεωλογικό και Μεταλλευτικό Ινστιτούτο της Ισπανίας

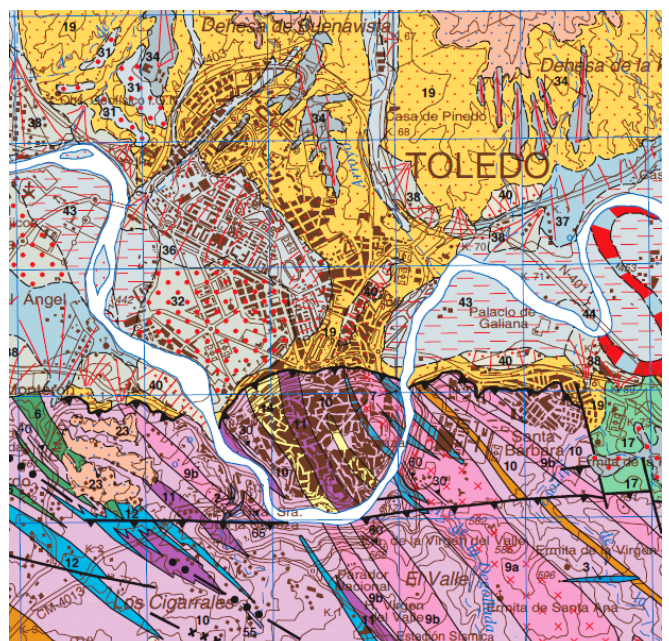
Γεωλογικός χάρτης της Ισπανίας

ΤΟΛΕΔΟ # 629

Κλίμακα 1:50.000



[C7]. Τολέδο. Τοπογραφικός και Μορφολογικός χάρτης (Rey Pastor 1928, Martín Aguado 1992).





ΠΡΩΙΜΟΙ ΣΥΓΚΙΝΗΜΑΤΙΚΟΙ - ΠΥΡΙΓΓΕΝΗ ΠΕΤΡΩΜΑΤΑ	
7.	Αμφιβολικός Γάββρος; τύπου <u>Τολέδο</u>
9. x x	Προσανατολισμένοι <u>πορφυριτικοί γρανοδιορίτες</u> ; τύπου <u>Αρχές - Γκουανταμούρ</u> . 9α. <u>Πορφυριτική</u> όψη/φάση. 9β. <u>Μικροπορφυριτική</u> έως <u>ισοκοκκώδης</u> όψη/φάση.
ΣΥΓΚΙΝΗΜΑΤΙΚΟΙ ΜΙΓΜΑΤΙΤΕΣ ΚΑΙ ΓΡΑΝΙΤΟΕΙΔΕΣ	
10.	<u>Λευκοκρατικοί μινιατίτες</u> και <u>ανομοιογενή διατεξτικά γρανιτοειδή</u> με <u>κορδιερίτη</u> και <u>γρανάτη</u> .
ΝΕΟΓΕΝΗΣ - ΜΕΙΟΚΑΙΝΙΚΟΣ - ΑΡΑΓΩΝΙΤΗΣ	
19.	Κροκαλοπαγή, άμμοι και <u>λουτίτες</u> , κόκκινου χρώματος.



[E3]. Η Βραχώμαζα στην ευρύτερη περιοχή. Παθητικά αγκύρια στερέωσης του βραχώδους πρσανούς του ορύγματος της οδού προς τη γέφυρα Alcántara.

#### Ε. ΦΩΤΟΓΡΑΦΙΕΣ @aRitsos



[E1]. Η Βορειοανατολική όψη της ιστορικής πόλης. Διακρίνεται η κεκλιμένη είσοδος προς το Συνεδριακό Κέντρο.



[E4]. Ο ποταμός Τάγος, από το σημείο θέασης προς Βορρά, στην ανώτερη στάθμη στο Συνεδριακό Κέντρο (+517,50m).



[E2]. Βορειοανατολική όψη της ιστορικής πόλης, η γέφυρα Alcántara, στους πρόποδες του Μεσαιωνικού κάστρου του San Servando. Δεξιά διακρίνεται η κεκλιμένη είσοδος προς το Συνεδριακό Κέντρο.

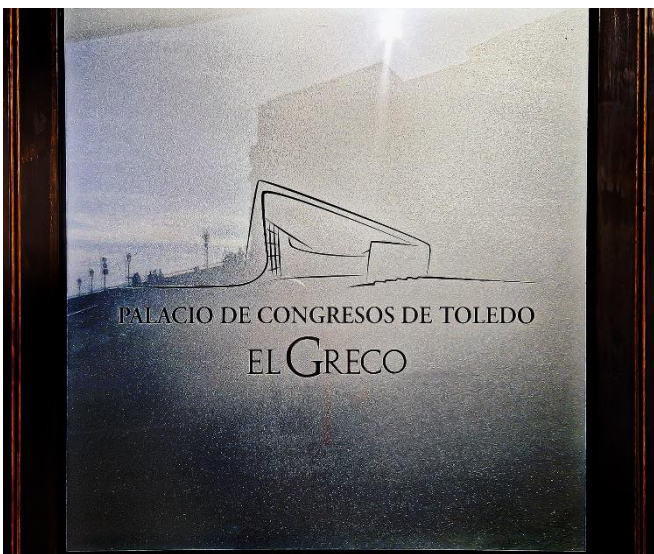


[E5]. Η πλατεία περί την είσοδο, στην ανώτερη στάθμη στο Συνεδριακό Κέντρο (+517,50m).





[Ε6]. Η είσοδος στο Συνεδριακό Κέντρο.



[9] El Greco Conference Center in Toledo. <https://www.pctoledo.es/en/>

[10] Toledo Convention Center El Greco. <https://en.www.turismocastillalamancha.es/mice--golf/palacio-de-congresos-de-toledo-el-greco-5444/descripcion/>

[11] Arquitectura Viva, a Madrid-based architecture magazine. <https://arquitecturaviva.com/works/toledo-congress-center>

[12] Geological Map of Spain. Scale 1:50.000 - Sheet 629 - TOLEDO of the National Geological Map (MAGNA) Spanish Geological Survey IGME: <https://info.igme.es/catalogo/re-source.aspx?portal=1&catalog=3&ctt=1&re-source=6707&lang=eng&dlang=eng&llt=dropdown&q=puntos%20de%20agua&master=in-foigme&shpu=true&shcd=true&shrd=true&shpd=true&shli=true&shuf=true&shto=true&shke=true&shla=true&shqc=true&shdi=true>

[http://info.igme.es/cartografiadigital/datos/Geo50/mapas/d6\\_PS50/Editado629\\_PSGeologico50.jpg](http://info.igme.es/cartografiadigital/datos/Geo50/mapas/d6_PS50/Editado629_PSGeologico50.jpg)

## F. ΒΙΒΛΙΟΓΡΑΦΙΑ

[1] Νίκος Καζαντζάκης, "Αναφορά στον Γκρέκο" (1957), το τελευταίο σπουδαίο έργο του, περιγράφει μια συνάντηση δύο μεγάλων Ελλήνων, δύο μεγάλων Κρητικών.

[2] Νίκος Καζαντζάκης, "Ταξιδεύοντας Ισπανία" (1937).

[3] "GEOLOGIA y MINERIA EN LA PROVINCIA DE TOLEDO" (1981), Francisco de Sales Córdo ha y Bravo, INSTITUTO PROVINCIAL DE INVESTIGACIONES y ESTUDIOS TOLEDANOS.

[4] IGME, No 53, TOLEDO, 1:200.000 (1986).

[5] "Paseo Geológico" 2007, POR LOS ALREDEDORES DE LA CIUDAD DE TOLEDO, Un viaje en el espacio Excursión geológica por los alrededores de Toledo Jacinto Alonso Azcárate, Andrés Díez Herrero.

[6] "Bases geológicas de Toledo, Consuegra y Melque" (2008), Carlos Martín Escorza, Sociedad de Amigos del Museo Nacional de Ciencias Naturales.

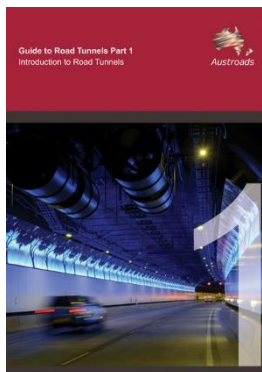
[7] "Geología y paisaje de los Montes de Toledo centro-orientales (2011), Miguel Ángel de San José et al.

[8] **Rafael Moneo**. <https://rafaelmoneo.com/en/projects/toledo-convention-center/>

# ΝΕΕΣ ΕΚΔΟΣΕΙΣ ΣΤΙΣ ΓΕΩΤΕΧΝΙΚΕΣ ΕΠΙΣΤΗΜΕΣ

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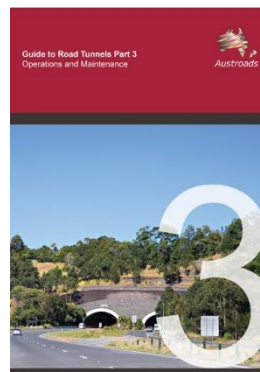
## Guide to Road Tunnels Part 1: Introduction to Road Tunnels

### Austrroads

Guide to Road Tunnels Part 1 outlines the structure of the Guide to Road Tunnels, while also introducing road tunnel planning. Part 1 describes key issues and considerations related to the implementation process, road tunnels in the context of a safe system, sustainability, general planning, structural design, drainage, geology and the environment. It also deals with critical considerations such as flood protection, fire and life safety, ventilation and risk management.

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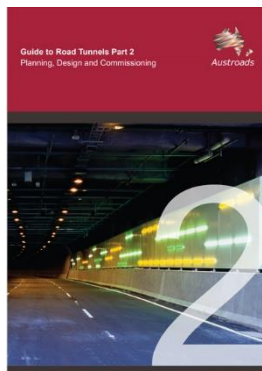
## Guide to Road Tunnels Part 3: Operations and Maintenance

### Austrroads

Guide to Road Tunnels Part 3 provides guidance on the management of the operation and maintenance aspects of road tunnels, including the factors to be considered in setting appropriate performance standards. Guidance is provided on stakeholder engagement relevant to the operation and maintenance of the tunnel, including the establishment of protocols required to ensure effective coordination, inspection and reporting, risk analysis, organisational framework, traffic management, incident management, maintenance requirements, asset management, human factors, training and environment.

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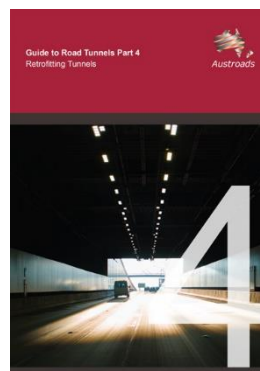
## Guide to Road Tunnels Part 2: Planning, Design and Commissioning

### Austrroads

Guide to Road Tunnels Part 2 provides guidance to those making decisions in the planning, design, operation and maintenance of new road tunnels in Australia and New Zealand. Principles and standards identified are based on both Australasian and international experience.

Part 2 sets out the Austrroads expectations regarding appropriate design for road tunnels. It discusses all aspects of planning, design and commissioning of road tunnels including structural and geotechnical requirements, fire and life safety, ventilation, lighting, traffic monitoring and control, plant monitoring and control, electrical power supply, the requirements for associated building structures and sustainability of road tunnels.

It is expected that the Guide will be used by engineers and technical specialists in tunnel technology working on the planning, design and operation of road tunnels, proponents of road tunnel solutions, senior decision makers (in an overview role) and regulators in the various jurisdictions associated with the construction of tunnels.



## Guide to Road Tunnels Part 4: Retrofitting Tunnels

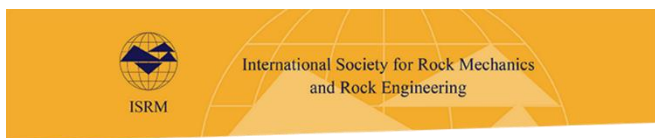
### Austrroads

Guide to Road Tunnels Part 4 provides guidance on the retrofitting of existing tunnels, including the need for refurbishment, the types of refurbishment and processes for developing project requirements. Guidance is provided on geometric considerations relating to cross-sections, traffic management functions including signs and lighting, fire and life safety including fire protection and evacuation, mechanical systems including pumps and lifts, electronic systems including power supply, energy efficiency and sustainability.

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# ΗΛΕΚΤΡΟΝΙΚΑ ΠΕΡΙΟΔΙΚΑ



Κυκλοφόρησε το ISRM Newsletter No. 67 - Autumn 2024 με τα ακόλουθα περιεχόμενα:

- [Eurock2025 and ISRM International Symposium 2025, Trondheim, Norway, 16-20 June 2025](#)
- [2024 ISRM International Symposium and ARMS13 successfully held in New Delhi, India, 24/26 September 2024](#)
- [47th ISRM Online Lecture by Professor Ranjith Pathegama Gamage](#)
- [ISRM Board and Council Meetings, 22 and 23 September 2024](#)
- [6th ISRM European Debate on 16th October](#)
- [Iranian Society for Rock Mechanics \(ISRM\) joined the ISRM](#)
- [ISRM Award winners were announced](#)
- [VietRock2024 - Hanoi, Vietnam, 26 October 2024](#)
- [CouFrac2024 - Kyoto, Japan, 13-15 November 2024](#)
- [1st ISRM Commission Conference on Estimation of Rock Mass Strength and Deformability, Lima, Peru, 6 December 2024](#)
- [ISRM Sponsored Conferences](#)



## IGS NEWSLETTER – September 2024

Κυκλοφόρησε το IGS Newsletter της International Geosynthetic Society με τα ακόλουθα περιεχόμενα:

*Helping the world understand the appropriate value and use of geosynthetics*

[www.geosyntheticssociety.org/newsletters](http://www.geosyntheticssociety.org/newsletters)

- Best Papers from 2023 Announced
  - *Geosynthetics International* Announce Best Papers For 2023 [READ MORE](#)
  - *Geotextiles And Geomembranes* – 2023's Best Papers Revealed [READ MORE](#)
- GIROUD LECTURE NOMINATIONS Deadline Approaching [READ MORE](#)
- Technical Committee News

- Global Gathering For TC- Reinforcement Workshop [READ MORE](#)
- 12th ICG TC-Barriers Workshop Report Now Available [READ MORE](#), [VIEW REPORT](#)
- MSE Walls Boost Sustainability In Egypt Seaside Project [READ MORE](#), [PDF](#) IGS Sustainability Case Study series [SEE ALL](#)
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  - 'Two For A Few' with Edoardo Zannoni and Michel Julien [READ MORE](#)
- Businesses – Share Your Sustainability Success Stories [READ MORE](#), [SUBMIT HERE](#)
- [13th International Conference on Geosynthetics](#)
- Upcoming Events
  - IGS Iran Webinar [REGISTER](#)
  - REGISTER NOW for IGS India Stabilization Workshop [READ MORE](#) & [REGISTER](#)
  - International Geotechnical Innovation Conference (IGIC) [READ MORE](#)
  - IGS Accredits Geotechnical Frontiers Conference [REGISTER](#), [READ MORE](#)
  - IV Romanian Conference on Geosynthetics (GeoSint 2025) [READ MORE](#)
  - GeoAsia 8 [www.geoasia8.org](http://www.geoasia8.org)
  - EuroGeo 8 [www.eurogeo8.org](http://www.eurogeo8.org)
- Calendar of Events



<https://issuu.com/ags-magazine/docs/ags-magazine-september-2024?cta=post-publish-view-live>

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- The importance of task-specific asbestos awareness training (AAT) - Page 28
- Standards Update: July 2024 - Page 32



## ΕΚΤΕΛΕΣΤΙΚΗ ΕΠΙΤΡΟΠΗ ΕΕΕΕΓΜ (2023 – 2026)

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