INTERNATIONAL SYMPOSIUM
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SEPTEMBER 2026 | ATHENS, GREECE

ATHENS TC301

ΕΛΛΗΝΙΚΗ ΕΠΙΣΤΗΜΟΝΙΚΗ ΕΤΑΙΡΕΙΑ ΕΔΑΦΟΜΗΧΑΝΙΚΗΣ & ΓΕΩΤΕΧΝΙΚΗΣ ΜΗΧΑΝΙΚΗΣ

# Τα Νέα της Ε Ε Ε Ε Γ Μ

190

## Καλό καλοκαίρι

Μήλος, Σαρακήνικο

Αρ. 190 – ΑΥΓΟΥΣΤΟΣ 2024

SIMSG ISSMGE

ISRM

ISSN: 2732-7248

## Π Ε Ρ Ι Ε Χ Ο Μ Ε Ν Α

**Evert Hoek**
**August 23, 1933 – July 6, 2024**

RMCC2024

1st International Rock Mass Classification Conference

**Rock Mass Classification meets the Challenges of the 21st Century**

**30 – 31. Oct 2024**
**Oslo, Norway**

Scientific Farewell to Dr. Evert Hoek – a Rock Engineering Legend
by the IAEG and ISRM

For IAEG: Prof. Vassilis P. Marinos and Dr. Trevor G. Carter
"Reliably Mastering Rockmass Strength Estimation using GSI"

The ISRM contribution will be announced soon

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# ΑΡΘΡΑ

GEOTECHNICAL HISTORY BLOG

SLOPE STABILITY IN THE AGE -OF- STEAM

**Review of Gregory (1844), "On railway cuttings and embankments"**

***By Michael Bennett, P.E., M.ASCE (Gannett Fleming TranSystems: Audubon, PA)***

The late 1830s and early 1840s were a key, if often overlooked, period of intensive technological change. Political events such as Queen Victoria ascending the British throne and William Henry Harrison becoming – just a month into his term – the first US President to die in office garnered more headlines, but the world hummed all the while with new inventions heralding the dawn of the Industrial Revolution. Americans Samuel Morse and Charles Goodyear created the telegraph and the vulcanization of rubber, respectively, while Louis Daguerre of France developed the first reliable photographic process. Perhaps most notably, UK engineers such as Robert Stephenson and Isambard Brunel made their nation a leader in the swiftly maturing technology of railroads. Civil engineers around the globe looked to their British counterparts for the latest railroading advances and even imported British locomotives for their own lines (Daniel 2004, Library 2020, RR Museum PA 2023, Somma 2014).

IMAGE 1: The Rocket, a British-built locomotive used by the US's Reading Railroad from 1838 to 1879. *Source: Author.*

The advances in British railroad engineering at the turn of the 1840s formed but one part of the broader developments playing out in UK civil engineering at the time. Members of Britain's Institution of Civil Engineers were advancing their field at a truly unprecedented rate, and the Institution began publishing its *Transactions* in 1836 to spread word of these breakthroughs to all its members. The next year, ICE debuted its *Minutes of Proceedings*, which would circulate for nearly a century. Geotechnics remained decades away from being a stand-alone civil engineering subdiscipline, but articles on geotechnical topics regularly appeared in *Minutes of Proceedings* from its outset. One sterling example was Charles Gregory's 1844 paper "On railway cuttings and embankments." During his remarkable 60-year career, Gregory created semaphore signaling for railroads, consulted on projects across the British Empire, and served a then-standard two-year term as ICE's president. Queen Victoria eventually knighted Gregory in recognition of his many achievements (Gregory 1844, ICE 1898, ICE 2024).

IMAGE 2: Undated portrait of Sir Charles Gregory. *Source: British Museum (2024).*

Gregory focused his piece on slope stability, a topic that remains of keen interest to geotechnical practitioners. He concentrated his writing on a 75- to 80-foot railroad cut near New Cross, a town that now forms part of southeastern London. The cut transected a layer of heterogeneous, fissured, highly permeable clay 55 to 60 feet thick, now commonly known as London brown clay, underlain by a strata of relatively strong, impermeable clay 15 to 20 feet thick, now known as London blue clay. The railroad tracks lay flush with the bottom of the blue clay layer. Notably, Gregory used Imperial units to describe the cut's stratigraphy; the UK wouldn't widely metrify its measurement system until the mid-1970s. In general, the geotechnical properties of London brown clay are: $w$ = 31%, LL = 82, PI = 52, clay fraction = 55%, $\gamma_{SAT}$ = 120 pcf, $\phi'$ = 20°, and su ranging from 1,500 psf at 5 feet deep to 3,300 psf at 30 feet deep (Gregory 1844, Lewisham Council 2024, Skempton 1977, UKMA 2024).

The London and Croydon Railway opened its double-track line through the cut in 1839. Two years later, on November 2, 1841, the cut's London brown clay strata underwent a 50,000 cubic yard slope failure (in British geotechnical parlance, a "slip"), leaving about 350 yards of track covered in 10 to 12 feet of clay. Railroad workmen cleared the slide in just over

two weeks, but two further slope failures in the London brown clay blocked the tracks later in November and took almost until Christmas to clear. Yet another slope failure in the London brown clay blocked the cut in early January 1842 and took about another month to clean up. Gregory mentioned no fatalities or derailments due to the failures, but they must have been immensely expensive, as the London and Croydon had to pay its laborers to work around the clock to clear each slide. The railroad also lost considerable revenue due to passenger and freight traffic it forfeited over the period of closures (Gregory 1844, Prockter 2021).

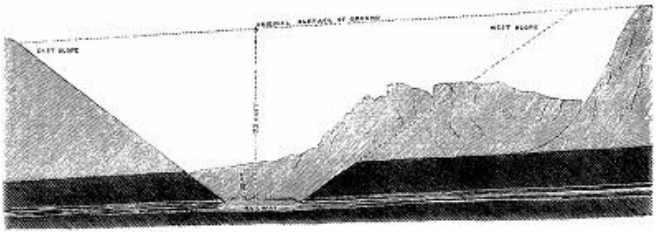
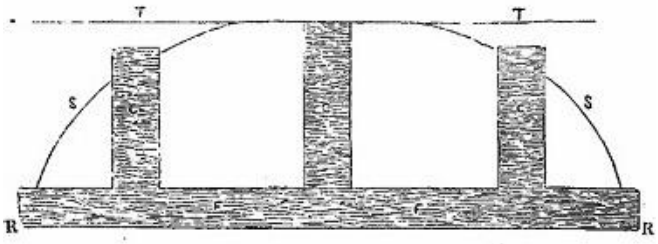


IMAGE 3: Cross-section of November 2, 1841, slope failure in a deep cut near New Cross along the London and Croydon Railway. *Source: Gregory (1844).*

The New Cross slides' financial burdens made it imperative for the London and Croydon Railway to avoid repeat incidents. Its civil engineers got to work implementing a series of simple, practical solutions. The first involved recognizing the ancient, sound principle that – in engineering as in medicine – an ounce of prevention is often worth a pound of cure. Early in 1842, laborers were excavating one of the slides when sharp-eyed crews spotted another one just getting underway. So, while some laborers continued digging out material from the completed slide, the railroad's civil engineers shifted others to excavate the material atop the incipient slide. For added measure, the engineers also had the crews excavate gentler slopes for the cut and add benches to these slopes. These tactics worked and collectively indicate that the engineers fundamentally, if not explicitly, grasped the key principle that reducing driving forces improves slope stability (Gregory 1844).

The London and Croydon Railway's civil engineers also approached their slope instability problems from the perspective of increasing the resisting forces. After the laborers finished excavating the New Cross landslides, the civil engineers also had them excavate the London blue clay adjacent to the tracks in the slide zones. The crews replaced this material with buttresses of compacted gravel, which both retained the slopes and allowed material to drain freely from their toes. The laborers also piled the excavated blue clay on the downhill side of the gravel drains to further stabilize the slopes. Finally, the crews laid drainage pipes along each bench of the slopes to further reduce the danger posed by moisture. These field remedies indicate that the railroad's civil engineers had a solid intuitive grasp of both driving and resisting forces in slope stability and the importance of maintaining drained conditions, at least to the extent possible, to improve soil shear strength. Their solutions worked so well that the London and Croydon adopted them as standard practice for remediating slope problems on its lines (Gregory 1844).

However, the London and Croydon Railway and its competitors still valued avoiding slope instability problems altogether above even the most reliable remediation techniques. It was on the New Cross slides' root causes that Charles Gregory presented his thoughts to ICE in 1844. In examining the case, Gregory found it noteworthy that the cut had performed well for over two years after its construction, with no visible evidence of creep or slope failure. He thus deduced that the introduction of some new factor to the cut must have caused the slides. Gregory and his peers knew that water readily saturated and became trapped within the London brown clay layer. Accordingly, Gregory hypothesized that seasonal cycles of wetting and drying propagated cracks within the layer "so that, year by year, the evil would become greater, and the tendency to slip gradually increase" until the slopes eventually gave way (Gregory 1844).




Elevation of Gravel counterforts, and footing, introduced into a Slip.

G. Gravel counterforts. F. Gravel footing. R. Level of rails.

T. Top of slope. S. Back of slip.

Image 4A: Top view of gravel buttresses used to stabilize problematic slopes along the London and Croydon Railway.

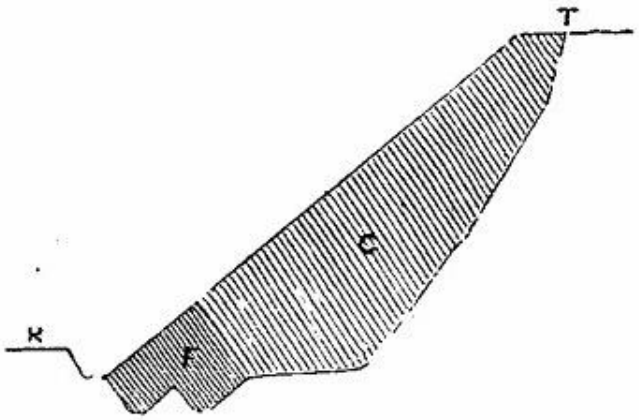



Image 4B: Side (R) view of gravel buttresses used to stabilize problematic slopes along the London and Croydon Railway. *Source: Gregory (1844).*

Following Gregory's presentation, he and his ICE colleagues engaged in spirited debate and discussion over the New Cross landslides. Many of his peers agreed with his hypothesis, while others put forth alternative culprits, such as dynamic loading of soil from passing trains. Over the next century, though, Gregory appeared to have been on the money. Karl Terzaghi himself posited during the 1936 International Conference on Soil Mechanics and Foundation Engineering a hypothesis of cohesive soil softening caused by cyclic wetting and crack expansion. Terzaghi's opinions on technical subjects often marked the end of discussion in geotechnical engineering's early days, as he and his supporters were known to take unkindly at times to opposing points of view. However, Terzaghi was often more open to diverging opinions than has been suggested. For instance, he became good friends with Alec (later Sir Alec) Skempton of Imperial College even as Skempton challenged and eventually disproved some of Terzaghi's conclusions, and they remained friends until Terzaghi's death in 1963 (Cowper et al. 1844, de Boer 2005, Gregory 1844, Peck 1985, Terzaghi 1936).

Fittingly, it was Alec Skempton who, in the 1970s, finally determined the true cause of the New Cross landslides. He had earlier studied clay behavior in depth and concluded that the limited extent of fissure-related softening observed in clays didn't support Terzaghi's wetting-cracking hypothesis. Skempton also realized that he and his peers had made the "tacit assumption" – always the riskiest type in geotechnical engineering or any field – that, after cuts were excavated through clay layers, pore pressures within the clay came to equilibrium rather rapidly as the soil expanded due to stress

relief. UK researchers disproved this assumption in the early and mid-1970s by showing via instrumentation studies that negative pore pressures in London brown clay (and, thus, the clay's shear strength) commonly take 40 to 50 years to equilibrate. Thus, the New Cross slides were caused by the combined effects of the clay in the excavations undergoing gradual shear strength loss and the mechanism of progressive failure in mobilizing the clay's remaining shear strength. Ironically, the first participant in the ICE discussion of Gregory's paper over a century earlier had come tantalizingly close to that truth when he said he "should be inclined to attribute the slips to the expansion of the clay, from the action of water" (Castellanos et al. 2015, Cowper et al. 1844, Terzaghi 1936).

IMAGE 5: Eminent UK geotechnical engineer Rudolph Glossop (L) joins Karl Terzaghi (C) and Alec Skempton (R), in enjoying a picnic in the English countryside, 1946. *Source: Chandler (2003).*

Since 1844, the geotechnical discipline of slope stability has advanced far beyond what Charles Gregory and his contemporaries would likely even have dreamed possible. Field and laboratory tests can be used to select appropriate shear strength parameters for soils of all kinds. Moreover, a variety of techniques such as the Swedish circle and the respective methods of Bishop, Spencer, and Morgenstern and Price have been developed to assess slope stability using these parameters. Over the past 50 years, reliable computer programs such as SLIDE2 and SLOPEW have come into vogue to accelerate slope stability evaluation and to assess greater numbers of potential failure surfaces; in recent decades, even newer numerical modeling methods have begun entering the geotechnical mainstream. Simultaneously, geotechs have been introducing reliability techniques into slope stability to allow failure probabilities to be computed alongside a traditional factor of safety. Yet a piece like Charles Gregory's write-up on the New Cross slides, even with its incorrect technical arguments, remains a valuable reminder that modern geotechnical engineering still depends just as much on intellectual curiosity, keen observation, and data-driven judgment as did early Victorian civil engineering. The tools of the trade have certainly changed, but its mission remains the same (Duncan et al. 2014).

**Acknowledgments**

Sebastian Lobo-Guerrero, Ph.D., P.E., BC.GE, M.ASCE (A.G.E.S., Inc.: Canonsburg, PA), the author's former colleague, reviewed the entry's geotechnical content. Thomas Kennedy (Geopier: Davidson, NC), the author's Virginia Tech classmate, co-authored a 2021 version of the entry posted on an independent webpage.

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# ΝΕΑ ΑΠΟ ΤΙΣ ΕΛΛΗΝΙΚΕΣ ΚΑΙ ΔΙΕΘΝΕΙΣ ΓΕΩΤΕΧΝΙΚΕΣ ΕΝΩΣΕΙΣ

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

**ISSMGE News**
www.issmge.org/news

## In Memoriam: François Schlosser

ISSMGE IT Administrator / General / 02-09-2024


**En mémoire François Schlosser**

Cest avec beaucoup de tristesse que nous venons dapprendre le décès du professeur Schlosser.

Président du CFMS de 1990 à 1994, François Schlosser a contribué de multiples façons à lamélioration et la diffusion des connaissances en géotechnique et mécanique des sols:

- Professeur de mécanique des sols et de géotechnique à lécole nationale des ponts et chaussées, l'école nationale des travaux publics de l'état, et l'école nationale des ingénieurs de Tunis, maître de conférence à l'école polytechnique, ou il a travaillé au laboratoire de mécanique des solides, il a dirigé la section mécanique des sols du Laboratoire central des ponts et chaussées, et a créé le Centre d'enseignement et de recherches en mécanique des sols.

- Fondateur du bureau d'études Terrasol, François Schlosser a fait avancer significativement la compréhension des massifs cloués avec son concept "multicritère", et a participé très activement à la promotion dans le monde entier du pressiomètre et de la terre armée.

- Consultant sur de nombreux ouvrages complexes le viaduc de Millau pour Nen citer qu'un seul -, François Schlosser a eu un rôle déterminant dans de très nombreux projets nationaux de recherche : Clouterre pour les murs en sol cloué, Asiri pour les fondations en sol renforcé, et Forever pour les micropieux. Il avait présenté les spécificités de linnovation française en géotechnique en session plénière lors congrès international de mécanique des sols et de géotechnique qui s'est tenu à Paris en 2013.

Ses nombreux élèves perdent leur maître, le monde de la recherche et de l'ingénierie un de ses plus brillants représentants, la géotechnique française un de ses meilleurs ambassadeurs, et ses collègues un ami dont tous louent les qualités humaines.

**In Memoriam: François Schlosser**

It is with great sadness that we have just learned of the passing of Prof. François Schlosser.

President of the French Society for Soil Mechanics and Geotechnical Engineering (CFMS) from 1990 to 1994, François Schlosser contributed in many ways to the improvement and dissemination of knowledge in geotechnics and soil mechanics:

- Professor of soil mechanics and geotechnics at the École Nationale des Ponts et Chaussées, the École Nationale des Travaux Publics de lÉtat, and the École Nationale des Ingénieurs de Tunis; lecturer at the École Polytechnique, where he worked in the Solid Mechanics Laboratory; director of the Soil Mechanics section at the Laboratoire Central des Ponts et Chaussées (Central Laboratory of Bridges and Roads); and founder of the Center for Teaching and Research in Soil Mechanics (CERMES).

- Founder of Terrasol, François Schlosser made significant advancements in the understanding of nailed masses through his "multi-criteria" concept and played a key role in promoting the use of the pressuremeter and reinforced earth on a global scale.

- Consultant on numerous complex structures, including the Millau Viaduct, François Schlosser played a decisive role in several national research projects: Clouterre for nailed soil walls, Asiri for reinforced soil foundations, and Forever for micropiles. He showcased the unique aspects of French innovation in geotechnics during a plenary session at the International Congress of Soil Mechanics and Geotechnics held in Paris in 2013.

His many students lose their master, the world of research and engineering one of its most brilliant representatives, French geotechnics one of its finest ambassadors, and his colleagues a friend whose human qualities were universally admired.

## Sophisticated numerical analysis in geotechnical design

ISSMGE Secretariat / TC103 / 23-08-2024

Dear all,

The recording of the debate night organized by the Australian Geotechnical Society, entitled "Sophisticated numerical analysis in Geotechnical design" is now available online on the following link: https://spaces.hightail.com/space/VnwhhyJWuE.

There is an interesting discussion and elements for a further reflection.

Francesca Ceccato

## ISSMGE Interactive Technical Talk Episode 19: Numerical Methods (TC103)

SSMGE IT Administrator / TC103 / 23-08-2024

The nineteenth episode of International Interactive Technical Talk has just been launched and is supported by TC103. Francesca Ceccato, Fusao Oka, Chia Weng Boon and Hamzah M. B. Al-Hansemi are discussing with Marc Ballouz about "Numerical Methods".

Watch ISSMGE Interactive Technical Talks

## Announcing the Publication of the 2024 Geotechnical Business Directory

ISSMGE IT Administrator / General / 27-08-2024


Geoworld, the network for geotechnical engineers, has just published the 2024 Geotechnical Business Directory. The directory is published with the support of the International Society for Soil Mechanics and Geotechnical Engineering. This is **the 10th year for the Geotechnical Business Directory, the most comprehensive directory in the geotechnical engineering field!**

This truly unique directory is available in **three** formats:

(a) an Online Interactive Platform,

(b) an e-book, and

(c) in-print through Amazon

The 2024 index has grown significantly since last year and includes **37,000+ members**, and **1,000**+ **geo-companies** and **geo-organizations** from a total of **162 countries**. It is expected to reach 50,000+ professionals through various media channels. The online platform of the directory allows visitors to search for professionals or companies based on location, experience, expertise, industry and other parameters. **There is no other such directory in geotechnical engineering**. The directory is also a "live" publication in the sense that as more members join and complete their profiles, the publication will become more comprehensive.

The online platform of the directory, which is updated daily, has increased search functionality compares to the e-book and printed version.

GeoWorld's team is already working on the 2025 Business Directory that is expected to include 40,000+ individuals and 1,100+ companies and organizations.

If you are not a member of GeoWorld, visit the website and join at no cost, so that you can be part of the 2025 Geotechnical Business Directory.

ISRM International Society for Rock Mechanics and Rock Engineering

## News

https://www.isrm.net

**47th ISRM online lecture** 2024-08-01

The 47th ISRM online lecture will be delivered by **Prof. Ranjith Pathegama Gamage**, from Australia. The lecture title is: "**Deep Geothermal Energy: A Key Player in the Sustainable Energy Mix**". It will be broadcast in September on a date to be announced, from the **Online Lecture's page**.

**6th ICITG - International Conference on Information Technology in Geo-engineering** 2024-08-28

**6th ICITG - International Conference on Information Technology in Geo-engineering** 2023-12-18

The Joint Committee 2 (JCT2) on Representation of Geo-engineering Data of FedIGS cordially invites you to the 6th International Conference on Information Technology in Geo-engineering (6th ICITG).

The conference will take place from 13-16 October 2026 in Oslo, Norway.

ASSOCIATION INTERNATIONALE DES TUNNELS ET DE L'ESPACE SOUTERRAIN AITES | ITA INTERNATIONAL TUNNELLING AND UNDERGROUND SPACE ASSOCIATION

## Scooped by ITA-AITES #122, 14 August 2024

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Critical Sydney Water infrastructure upgrade underway | Australia

[$590m contract awarded for Jurong Lake District MRT station and tunnels, work to start in Q4 | Singapore]

INTERNATIONAL GEOSYNTHETICS SOCIETY

**www.geosyntheticssociety.org**

**News**

**MID-YEAR MESSAGE TO MEMBERS** August 1, 2024

Dear IGS Colleagues, I hope this message finds you well as we have passed the mid-year point of 2024. It's been good to see the **Read More »**

**10 Questions With… Alberto José Pérez Zarco** August 5, 2024

The IGS welcomed its newest Chapter earlier this year – IGS Guatemala. Here, its Vice President Alberto José Pérez Zarco shares the journey to ratification, reveals **Read More »**

**Watch: 'Two For A Few' With IGS Engineers Victor Pimentel and Vinicius Benjamim** August 6, 2024

Sustainability as a game-changer for geosynthetics investment in Latin America is discussed in the latest 'Two for a Few' video. Victor Pimentel, Past President of **Read More »**

**IGS Foundation Grants Boost Young Members' Learning** August 12, 2024

Travel grants provided by the IGS Foundation (IGSF) enabled seven young engineers to attend the prestigious 5th GeoAmericas conference in Toronto, Canada. The IGSF is **Read More »**

**IGS Accredits Geotechnical Frontiers Conference** August 15, 2024

The IGS has secured a host of benefits for members after endorsing one of the industry's premier conferences on geotechnical engineering. The Geotechnical Frontiers conference **Read More »**

**Watch: 'Two For A Few' With Edoardo Zannoni And Michel Julien** August 20, 2024

Environmental sustainability in mining is discussed in the latest 'Two for a Few' video series. IGS Vice President Edoardo Zannoni caught up with Michel Julien, **Read More »**

**10 Minutes With… Sam Allen** August 22, 2024

Reinvigorate your knowledge about the IGS as President Sam Allen launches the first of our new '10 Minutes With…' video series. The new resource is **Read More »**

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**News**
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Earthworks 2025 Conference - Pre-announcement of the Call for Abstracts 09.08.2024

The BGA is pleased to announce that their 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 Call for Abstracts will open in September 2024 Read More

# ΔΙΑΚΡΙΣΕΙΣ ΕΛΛΗΝΩΝ ΓΕΩΤΕΧΝΙΚΩΝ ΜΗΧΑΝΙΚΩΝ

**Κατερίνα Ζιωτοπούλου**
**Ziotopoulou and Nagarajan nominated G-I board**

**The Geo-Institute Board of Governors has nominated Katerina Ziotopoulou, Ph.D., P.E., M.ASCE and Lucky Nagarajan, A.M.ASCE , to join the G-I Board for a term beginning in October 2024.**

**Katerina Ziotopoulou** is an Associate Professor in Civil and Environmental Engineering at the University of California at Davis (UC Davis), and a licensed Professional Engineer in the State of California. Prior to joining UC Davis, she served on the faculty at Virginia Tech. She received her PhD (2014) and MS (2010) degrees in Civil Engineering from UC Davis, and her undergraduate 5-year diploma degree in Civil Engineering from the National Technical University of Athens, Greece (2007).

Dr. Ziotopoulou specializes in geotechnical earthquake engineering with an emphasis on investigating ground failure due to earthquake-induced liquefaction and cyclic softening, and its mitigation. She combines the development of advanced numerical tools with multiscale experimental methods, the establishment of validation protocols that connect the two, and the upscaling to system-level analyses of case histories accounting for the spatial variability of soil deposits. She is a faculty advisor in the Center for Geotechnical Modeling of UC Davis, a national shared-used centrifuge facility under NHERI (Natural Hazards Engineering Research Infrastructure). Funding for her research has come from federal, state, and industry sources, including a CAREER Award from the National Science Foundation in 2020. Her research outcomes have significantly impacted both research and practice and have been adopted in hundreds of projects worldwide. One of Katerina's key educational and professional development contributions is her sustained and dedicated dissemination of state-of-the-art models and approaches for dynamic numerical modeling of soil and soil-structure systems. She is passionate about teaching and mentoring and has successfully maintained a steady line of funding related to enhancing the mentoring of underrepresented students in engineering, mentoring women through career transitions, and addressing the unique challenges faced by first-generation graduate and international students.

Katerina Ziotopoulou is the recipient of the 2021 Arthur Casagrande Professional Development Award of ASCE, the National Science Foundation CAREER Award, the 2024 International Society of Soil Mechanics and Geotechnical Engineering's TC203 Young Researcher Award, and the 2024 U.S. Universities Council on Geotechnical Education & Research (USUCGER) Early Career Educator Award. At UC Davis, she has been honored with a Graduate Program Advising and Mentoring Award (2023) and an Excellence in Teaching Award (2022). She is an Associate Editor of the ASCE Journal of Geotechnical & Geoenvironmental Engineering, and an Editorial Board Member of Computers and Geotechnics and the Canadian Geotechnical Journal. She is also serving on the Advisory Board of the DesignSafe NHERI Cyberinfrastructure. She has chaired the EERI Student Awards Committee, and the 2021 EERI Annual Meeting. Within ASCE, she was a member of the Organizing Committee of GeoCongress 2022 and later served as the Technical Co-Chair of GeoCongress 2024. She has been a member of the Soil Dynamics and Earthquake Engineering Committee since 2014 and of the Innovative Technologies and Tools in Geotechnical Engineering Committee since 2022.

https://geoinstitute.org/news/ziotopoulou-and-nagarajan-nominated-g-i-board

# ΠΡΟΣΕΧΕΙΣ ΓΕΩΤΕΧΝΙΚΕΣ ΕΚΔΗΛΩΣΕΙΣ

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

4ο Συνέδριο Φραγμάτων και Ταμιευτήρων, 10 και 11 Σεπτεμβρίου 2024, Αθήνα, www.gcold-conference.gr

ISIC 2024 4th International Conference of International Society for Intelligent Construction, 10 – 12 September 2024, Orlando, United States, www.is-ic.org/conferences/2024-isic-international-conference

International Symposium on Dams and Earthquakes, 7th Meeting of the EWG, 12 -13 September 2024, Athens, Greece, link.

GROUND ENGINEERING SUSTAINABILITY, 18 September 2024, London, United Kingdom, https://sustainability.geplus.co.uk/sustainability2024/en/page/home

NGM 2024 19th Nordic Geotechnical Meeting, 18th - 20th of September 2024, Göteborg, Sweden, www.ngm2024.se

ISRM International Symposium 2024 and 13th Asian Rock Mechanics Symposium (ARMS13), 22 to 27 September 2024, New Delhi, India, https://arms2024.org

IS-Grenoble 2024 Geomechanics from Micro to Macro, September 23-27, 2024, Grenoble, France, https://is-grenoble2024.sciencesconf.org

International Symposium on Dams and Earthquakes, 7th Meeting of EWG, September 25-27, 2024, Athens, www.eemf.gr

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

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.icgdr.com/Home/Detail/87

5th European Conference on Physical Modelling In Geotechnics, 02 to 04 October 2024, Delft, Netherlands, https://tc104-issmge.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

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

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

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

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-, 2025, Sydney, Australia, 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

GeoAsia8
BRISBANE, AUSTRALIA
10 - 13 June 2025

**8th Asian Conference on Geosynthetics**
**10-13 June 2026, Brisbane, Australia**
**https://geoasia8.org**

With great excitement, we extend our invitations to you for the upcoming GeoAsia8 conference, scheduled to take place in the vibrant city of Brisbane, Australia, from 10 – 13 June 2025. As proud hosts, the Australasian Chapter of the International Geosynthetics Society (ACIGS) welcomes you to this

international gathering that stands as the 8th Asian Conference on Geosynthetics (GeoAsia8).

The conference's primary mission is to delve into the multifaceted dimensions of geosynthetics. Our focus encompassses the applications of geosynthetics in civil and geotechnical engineering, with a special emphasis on research and development. The profound impact of geosynthetics resonates throughout the design and construction of reinforcement, hydraulics, stabilisation and barrier systems, and beyond, propelling scientific advancement to unprecedented heights.

Australia has emerged as a vibrant hub of geosynthetics industry, and Brisbane, with its fusion of cultural richness, innovation, and natural splendour, serves as an ideal backdrop for this gathering of minds. Beyond the intellectual exchange of the conference, the captivating spirit of Brisbane promises an enriching experience for all attendees.

We eagerly anticipate your presence at GeoAsia8 in Brisbane, where we will collectively chart new frontiers in geosynthetics, laying the foundation for future breakthroughs. Your invaluable contributions and insights will propel our field toward a future brimming with possibilities. The connections and collaborations that are bound to flourish during this event fill us with anticipation and excitement.

The GeoAsia8 2025 Program will be made up of talks and abstract presentations that focus on a range of GeoSynthetic themes, included below:

T1 – Sustainability with Geosynthetics
T2 – Geosynthetics Properties and Testing
T3 – Soil-Geosynthetic Interaction
T4 – Durability and Long Term Performance
T5 – Reinforced Walls and Slopes
T6 – Basal reinforced Embankments, GEC, piles and shallow Foundations
T7 – Seismic design with geosynthetics
T8 – Unpaved and paved roads
T9 – Railways and other Transportation Applications
T10 – Landfills and remediation of contaminated sites
T11 – Filtration and Drainage
T12 – Erosion Control and coastal applications
T13 – Hydraulic applications: canals, reservoirs and dams
T14 – Innovative materials and technologies
T15 – Design approaches and other applications
T16 – Case Histories
T17 – Mining applications
T18 – Tunnels and underground constructions

**Contact Us**

For all registration enquiries contact us at: register.geoasia8@arinexgroup.com
For all program and general enquiries contact us at: geoasia8@arinexgroup.com

Telephone: +61 2 9265 0700

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 - Implementing the Energy Transition, 17-20 June 2025, Paris, France, Kamelia Atefi-Monfared, catefi@yorku.ca

6th International Conference GEE2025: Charting the path toward the future Geotechnical Engineering Education July 2-4 2025, Nancy, France, https://gee2025.sciences-conf.org/

ISGSR2025 9th International Symposium for Geotechnical Safety and Risk, 24th – 27th August 2025, Oslo, Norway, www.isgsr2025.com

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

EURO GEO 8
LILLE 2025 15-18 September

**Technical Challenges and Environmental Imperatives for the 21st Century**
**https://eurogeo8.org**

**EuroGeo 2025 is the 8th European Conference on Geosynthetics.** This regional conference of the International Geosynthetics Society (IGS) is held every four years. The conferences connect researchers, civil engineers, infrastructure professionals, and sustainability experts from around the world to share technologies, design strategies, and innovations with a special focus on beneficially impacting engineering in the European countries with geosynthetics.

The main theme of the Conference is: Technical Challenges and Environmental Imperatives for the 21st Century. The new challenges faced by construction professionals, environmental concerns, innovation and risk management will be at the heart of the discussions and presentations.

Almost 50 years after the first and historical International Conference on Geosynthetics in 1977 on the Use of Fabrics in Geotechnics in Paris, where two terms that have become

central to the field of geosynthetics: "geotextile" and "geomembrane" were established and 22 years after the 7th International Conference on Geosynthetics (7 ICG) in Nice in 2002, the CFG French Chapter of IGS decided to welcome you for the 3rd time in Lille for this 8th European Conference.

At the heart of Europe's largest consumption area, Lille is a welcoming and warm city. It is less than 60 minutes by TGV from Paris, 35 minutes from Brussels and 80 minutes from London.

The aim of the CFG French Chapter of IGS is to bring together in a single group individuals and legal entities interested in the development of geosynthetics in all fields, in particular with regard to their production and distribution, the design and engineering of structures incorporating these types of

products, their prescription, implementation, research and training.

This includes promoting the state of the art of using geosynthetics, and encouraging research in the field of geosynthetics. This 8th European Conference welcomes you in this spirit.

**Topics**

With over 50 years of their successful use, geosynthetics have proved to be a sustainable equivalent to conventional solutions. They are widely acknowledged and accepted. We would like to pay attention to the correct use of geosynthetics with respect to their design service life, functions, long term performance and durability and with concern for environmental impact of the works.

Proposed conference sessions include:

1. Sustainability with Geosynthetics
2. Environmental performance
3. Circular economy
4. Natural Geosynthetics
5. Standardization, quality control and quality assurance
6. Geosynthetics properties and testing
7. Soil-Geosynthetic interaction
8. Durability and long-term performance
9. Innovative materials and technologies
10. Specific Geosynthetics applications
11. Filtration and drainage
12. Landfills and mining and remediation of contaminated soils
13. Hydraulic applications: canals, reservoirs, dykes, and dams
14. Polymeric, bituminous and clay barriers
15. Unpaved and paved roads, railways and other transportation applications
16. Embankments on soft soils
17. Basal reinforced embankments, geotextile encased columns, piles and shallow foundations
18. Reinforced walls and slopes
19. Case histories
20. Physical and numerical models
21. Design approaches
22. Seismic design with Geosynthetics
23. Geosynthetics in engineering practice
24. Special session for Young Members
25. Geosynthetic Education Ideas Competition: All those interested are invited to propose innovative "demonstrators", which could serve as a basis for educational laboratory work, at the engineering school level, to demonstrate the multi-functional effectiveness of geosynthetics associated with soils. The best proposals, in the form of videos, will be presented at the Conference.
26. Field testing and monitorin

**Contact**

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**secretary@eurogeo8.org**

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

21st International Conference on Soil Mechanics and Geotechnical Engineering Geotechnical Challenges in a Changing Environment, 14 – 19 June 2026, Vienna, Austria, www.icsmge2026.org/en

ISFMG 2026 12th International Symposium on Field Monitoring in Geomechanics, 06 -10 August 2026, Indian Institute of Technology Indore, India, https://sites.google.com/view/isfmg2026/home

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

Contact Person Name

Prof. Milorad Jovanovski

Email jovanovski@gf.ukim.edu.mk

**13th International Conference on Geosynthetics (13 ICG)**
**13-17 September 2026, Montréal, Canada**
**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 & Historic Sitew, 16 – 18 September 2026, Athens, Greece https://tc301-athens.com

## 6th International Conference on Information Technology in Geo-engineering (6th ICITG)

**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).

Organizer

Norwegian Geotechnical Institute, Graz University of Technology

Contact Information

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## ARMS14
## 14th Asian Rock Mechanics Symposium - ARMS14, an ISRM Regional Symposium
## 22-26 November 2026, Fukuoka, Japan

Contact Person Name
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## 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, CO2 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 ΓΕΩΤΕΧΝΙΚΑ ΝΕΑ

## An interesting landslide mechanism from Iceland

**A landslide at Skíðaskálinn in Hveradalir, Iceland in July was triggered by a combination of heavy rainfall and geothermal activity.**

Iceland Monitor has a very interesting article about a small landslide that occurred during heavy rainfall 0n 13 to 14 July 2024 on the southeastern side of Skíðaskálinn in Hveradalir, Iceland. This image shows the site and the landslide:-

The 13 – 14 July 2024 landslide at Skíðaskálinn in Hveradalir, Iceland. Image by Eggert Jóhannesson via mbl.is.

The landslide has exposed a hot spring – note the steam shown in the image above. The failure was triggered during a period of heavy, but not exceptional, rainfall. The landslide has been investigated by Þráinn Friðriksson, a geologist working for Reykjavík Energy, in collaboration with Iceland GeoSurvey (ÍSOR), the Icelandic Met Office and Efla Engineering.

Their work suggests that the geothermal activity has weakened the soil above the spring – this is very probable. As an aside, in Nepal, we often see landslides at locations known locally as Tatopani, which translates as "hot water" (see this example as a case in point). Landslides are more frequent in these areas in part because of the weathering of the soil and rock caused by the geothermal activity.

In the Iceland example, the rainfall then saturated the soil, but the presence of steam increased the pore water pressures, triggering the failure.

Unroofing the spring would have led to a rapid release of the pressure, which resulted in the weathered soils and regolith being ejected onto the surrounding terrain.

(Dave Petley / THE LANDSLIDE BLOG, 9 August 2024, https://eos.org/thelandslideblog/iceland-geothermal-landslide-1)

## The 7 August 2024 Pedersen Lagoon landslide and tsunami

**A c.2 million cubic metre landslide occurred on a rock slopes above Pedersen Lagoon in Alaska, USA, triggering a local tsumani that was up to 17 m high.**

At about 5 am local time on 7 August 2024, a large landslide occurred on the rock slopes above Pedersen Lagoon in Alaska, triggering a local tsunami. Whilst this major event is lower profile than one might have expected (I cannot find any news stories about it), the USGS has been quietly putting together a range of fantastic resources about the event. Rather than replicating them, I will simply sign post to them.

First, there is a very good gallery of image about the event, which includes this image by Jeff Pedersen of Alaska Wildland Adventures:-

The source and upper track of the Pedersen Lagoon landslide. Photo taken on 9 August 2024, courtesy of Jeff Pedersen of Alaska Wildland Adventures, via the USGS.

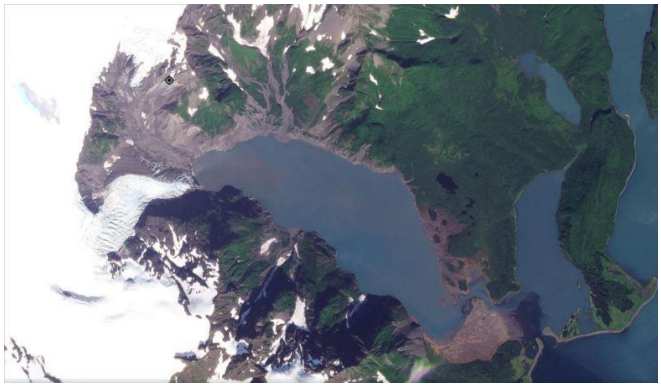
The exposed rock surface shows a large part of the source area – this is an existing plane of weakness – and there is an element of wedge failure here.

Second, the USGS has put together a very nice page that summarises the dynamics of the landslide. It notes that the estimated initial volume was 2 million $m^3$, occurring in a flysch unit. The tsunami that was generated had an initial height of 17 metres, although this reduced to about a metre along the lagoon. A large area was inundated, but there were no human casualties and little damage in this sparsely populated area.

The seismic data indicates that a seiche occurred.

The National Park Service also has a news item about the landslide.

Planet Labs has captured beautiful imagery of this site. The image below, from 19 August 2024, shows the aftermath of the landslide and the tsunami:-



Satellite image of the aftermath of the 7 August 2024 Pedersen Lagoon landslide and tsunami in Alaska. Image copyright Planet Labs, used with permission. Image dated 19 August 2024.

And below is an image compare with one collected on 19 July, before the event:-

I have placed a marker at the approximate crown of the landslide, situated towards the northwest corner of the image. The initial track is towards the southwest, then curving to the southeast to enter the fjord. Note the extensive erosion of vegetation and soil along the flanks of the lagoon, particularly to the lower lying east end.

Of course this is just the latest in a series of large landslides in Alaska in recent years, underlying the dynamic nature of the landscape in this area. Landslide generally occurring in the spring and summer.

Reference

Planet Team (2024). Planet Application Program Interface: In Space for Life on Earth. San Francisco, CA. https://www.planet.com/.

(Dave Petley / THE LANDSLIDE BLOG, 22 August 2024, https://eos.org/thelandslideblog/pedersen-lagoon-landslide-1)

Greenland's glaciers and permafrost are melting at an accelerating rate because of global climate change. Photograph: Luis Leamus/Alamy

Just under a year ago, the east coast of Greenland was hit by a megatsunami. Triggered by a large landslide entering the uninhabited Dickson Fjord, the resulting tsunami was 200 metres high – equivalent to more than 40 double-decker buses.

Luckily no one was hurt, though a military base was obliterated. Now analysis of the seismic data associated with the event has revealed that the tsunami was followed by a standing wave, which continued to slosh back and forth within the narrow fjord for many days.

Angela Carrillo Ponce from the German Research Centre for Geosciences in Potsdam, analysed the seismic data, recorded at earthquake monitoring stations more than 3,000 miles (5,000km) away, and found signals persisting long after the 16 September 2023 landslide event.

Using satellite images and computer modelling, Ponce and her colleagues were able to confirm the presence of a standing wave of about 1 metre in height which lasted for more than a week.

Their findings, published in The Seismic Record, warn that climate change is accelerating the melt of Greenland's glaciers and permafrost, increasing the chance of landslides and subsequent megatsunamis.

Smaller events have been observed a number of times in recent years, such as the rock avalanche into western Greenland's Karrat Fjord in 2017, which triggered a tsunami that flooded the village of Nuugaatsiaq, destroying 11 houses and killing four people.

(Kate Ravilious / News The Guardian, Fri 23 Aug 2024, https://www.theguardian.com/science/article/2024/aug/23/megatsunami-risk-on-the-rise-as-glacial-melt-drives-landslides)

## Megatsunami risk on the rise as glacial melt drives landslides

**Geoscientists studying 200m-high wave that hit Greenland coast last year warn of potentially disastrous impact**

## The 16 September 2023 Greenland Megatsunami: Analysis and Modeling of the Source and a Week-Long, Monochromatic Seismic Signal

**Angela Carrillo-Ponce; Sebastian Heimann; Gesa M. Petersen; Thomas R. Walter; Simone Cesca; Torsten Dahm**

**Abstract**

On 16 September 2023, a cascade of events occurred in East Greenland, involving a large tsunami that hit a military unit. Here, we use seismic waveform data recorded on regional to

global scales and compare to high-resolution satellite images to learn about the cascade of events. We find two distinct seismic signals and develop a conceptual and physical model explaining the observations: initially, the high-energy seismic signals (0.02–0.06 Hz) occurred, followed by an over one-week-long monochromatic signal (0.0109 Hz) recorded even at 5000 km distance. Our single force (SF) inversions characterize both an initial rockslide and the one-week-long seiche oscillation processes. The rockslide signal is well reproduced by west and downward SF, with an orientation consistent with observations on satellite imagery. The amplitude decay of the week-long oscillation, stacked at three teleseismic arrays, is fitted with a damped oscillator model. Using a simple analytical model of water seiching in a narrow fjord, we can explain the force direction and frequency consistent with the results from SF inversion.

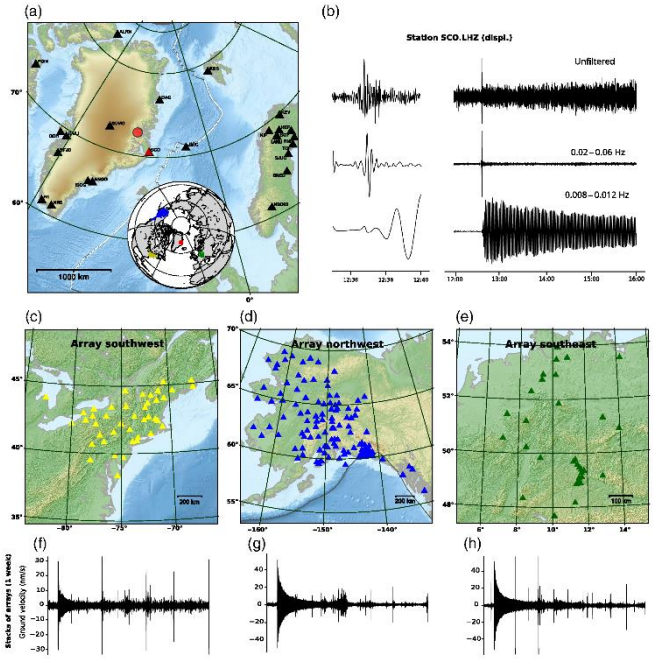



Figure 1. Seismic observations at regional and teleseismic distances. (a) Regional seismic stations that recorded both long- (LP) and very-long-period (VLP) waveforms were used for source inversion. (b) Example of waveform records at the closest station SCO (red triangle in panel a), vertical component, unfiltered (top), band-pass filtered between 0.02 and 0.06 Hz (center), and 0.008–0.012 Hz (bottom). (c–e) Three arrays at teleseismic distances, see inset in panel (a) for array locations. (f–h) The stacked waveform records show the one-week-long VLP oscillation. Note that Love waves (transverse components) are shown for the southwest array, and Rayleigh waves (vertical components) are shown for the southeast and northwest arrays.

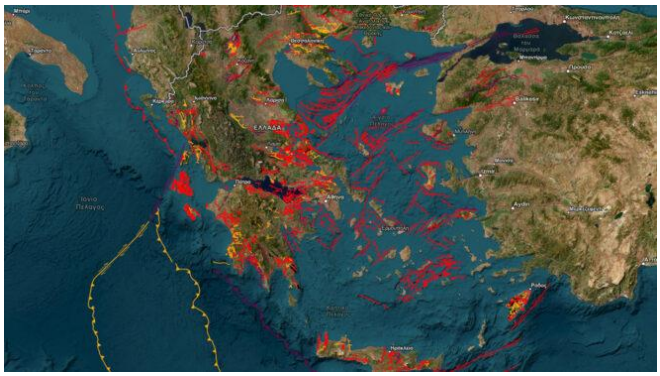
…

(The Seismic Record (2024) 4 (3): 172–183. August 08, 2024 https://doi.org/10.1785/0320240013)

# ΕΝΔΙΑΦΕΡΟΝΤΑ - ΣΕΙΣΜΟΙ & ΑΝΤΙΣΕΙΣΜΙΚΗ ΜΗΧΑΝΙΚΗ

### Πού βρίσκονται τα ενεργά ρήγματα της Ελλάδας

**Ψηφιακός χάρτης προσβάσιμος σε όλους, με όλα τα ρήγματα της χώρας και τα χαρακτηριστικά τους**



«Φόβος για μεγάλο **σεισμό** στην Αττική». «Ανησυχία σεισμολόγων για νέο μεγάλο σεισμό». Αφθονοι οι τίτλοι το τελευταίο διάστημα στα ηλεκτρονικά κυρίως μέσα που υπονοούν ότι επίκειται μεγάλος σεισμός στον ελλαδικό χώρο. Τα σενάρια φαίνεται να πυροδοτεί και η «σεισμική άπνοια» («Ο Εγκέλαδος μαζεύει ενέργεια» όπως γράφεται), αλλά και οι δονήσεις όπως αυτή το απόγευμα, της τάξης των 5,2 ρίχτερ ανοιχτά της Γαύδου, που ωστόσο έγινε αρκετά αισθητή στην Κρήτη. (Μεγάλος σεισμός πάντως θεωρείται κάποιος άνω των 6 ρίχτερ.) «Η τρομοκρατία του κοινού είναι ένα μόνιμο πρόβλημα που αντιμετωπίζουμε» αναφέρει μιλώντας στην «Κ» ο καθηγητής Φυσικής Λιθόσφαιρας, Σεισμολογίας & Εφαρμοσμένης Γεωφυσικής στο ΑΠΘ Κώστας Παπαζάχος.

Σε μια χώρα με έντονη σεισμικότητα όλα αυτά προκαλούν ανησυχία. «Δυστυχώς αναπαράγονται από τα Μέσα άκριτα. Θα δείτε μια τελείως ατεκμηρίωτη είδηση σε ένα σάιτ να αναπαράγεται αυτούσια από δεκάδες άλλα. Είναι ένα σύγχρονο φαινόμενο που μάλιστα επιδεινώνεται όσο πάει αφού όλο και περισσότερα σάιτ υποχρεώνονται στη γρήγορη αναδημοσίευση, κάτι στο οποίο δεν έχει βρεθεί κάποια απάντηση». Στις περισσότερες περιπτώσεις, λέει ο κ. Παπαζάχος, ο τίτλος αρκεί. «Τα περισσότερα δημοσιεύματα κάνουν λόγο για αυξημένη σεισμική ανησυχία στην Ελλάδα και από κάτω δεν γράφουν απολύτως τίποτα. Είναι τελείως ψευδείς ειδήσεις, χωρίς καμία βαρύτητα». Για τον ίδιο μάλιστα, όχι μόνο δεν υπάρχει ανησυχία, αντίθετα υπάρχει σεισμική… ησυχία. «Από την περίοδο ’20-’21, που είχαμε μεγάλους σεισμούς σε Τύρναβο, Σάμο, Αρκαλοχώρι έχουμε περάσει σε μια περίοδο χωρίς ιδιαίτερη σεισμική δραστηριότητα». Φαινόμενο απόλυτα φυσιολογικό.

Οσον αφορά τον σημερινό σεισμό στην Κρήτη, οι σεισμολόγοι τηρούν για την ώρα στάση αναμονής προκειμένου να συγκεντρώσουν περισσότερα στοιχεία.

Παρά τις σειρήνες πάντως των fake news, η επιστήμη προχωρά. Στον «αέρα» βρίσκεται πλέον ψηφιακός χάρτης με όλα τα ρήγματα της Ελλάδας και τα χαρακτηριστικά τους, που προετοίμαζε τα τελευταία δύο χρόνια η Ελληνική Αρχή Γεωλογικών και Μεταλλευτικών Ερευνών (ΕΑΓΜΕ) με στοιχεία από το Γεωδυναμικό Ινστιτούτο, τα Πανεπιστήμια Αθηνών, ΑΠΘ και Πάτρας και το ΕΛΚΕΘΕ, υπό την εποπτεία/συντονισμό του ΟΑΣΠ (Οργανισμός Αντισεισμικού Σχεδιασμού και Προστασίας). Ο χάρτης, σύμφωνα με τα όσα είπε στην «Κ» ο γεωλόγος της ΕΑΓΜΕ Δημήτρης Γαλανάκης, έχει αυτή τη στιγμή 5.500 αναγραφές στον ελλαδικό χώρο. «Προσοχή ο αριθμός αυτός δεν ταυτίζεται με τον αριθμό των ρηγμάτων γιατί για παράδειγμα ένα ρήγμα 40.000 χιλιομέτρων μπορεί να έχει 10 αναγραφές».

Στο χάρτη, τον οποίο ο καθένας μπορεί να επισκεφθεί στη σελίδα **activefaults.eagme.gr**, διακρίνονται ρήγματα με κόκκινο, με κίτρινο και με μωβ χρώμα. Σε αδρές γραμμές, με μοβ χρώμα παρουσιάζονται τα λεγόμενα «σεισμικά ρήγματα» αυτά δηλαδή που αποδεδειγμένα σχετίζονται με έναν ή περισσότερους από έναν σεισμούς στην ενόργανη ή ιστορική περίοδο (είναι τα πλέον «επικίνδυνα»), με κόκκινο χρώμα τα «ενεργά ρήγματα», δηλαδή αυτά τα οποία έχουν παρουσιάσει μετατόπιση τουλάχιστον μία φορά κατά το Ανώτερο Πλειστόκαινο (τα τελευταία 126.000 χρόνια περίπου) και κατά συνέπεια μπορεί να αποτελέσουν πηγή μελλοντικού σεισμού, και με κίτρινο χρώμα τα «δυνητικά ενεργά ρήγματα», αυτά που έχουν χαρακτηριστικά που θυμίζουν ενεργά ρήγματα (έχουν δραστηριοποιηθεί τουλάχιστον μια φορά κατά τη διάρκεια του Τεταρτογενούς, τα τελευταία 2.600.000 έτη).

«Μέχρι σήμερα έχει γίνει συστηματική δουλειά και αρκετά ενεργά ρήγματα έχουν αποκαλυφθεί», λέει ο κ. Παπαζάχος. «Ο ΟΑΣΠ πήρε την πρωτοβουλία να συστηματοποιήσει αυτή τη γνώση και να την αναπτύξει. Αυτή η βάση δεδομένων είναι μια πρώτη προσπάθεια να δούμε σε ένα χάρτη τι ξέρουμε και τι δεν ξέρουμε». Οπως διευκρινίζεται ο χάρτης θα είναι δυναμικός, συνεχώς θα επικαιροποιείται και θα εμπλουτίζεται.

Τον χάρτη δεν θα συμβουλεύονται όμως μόνο οι σεισμολόγοι. «Εχει μεγάλη σημασία η πρόσβαση στη βάση δεδομένων από πολιτικούς μηχανικούς, πολεοδόμους, Δήμους που χρειάζονται αυτές τις πληροφορίες για κάθε είδους μελέτες. Δεν είναι δυνατόν να χωροθετηθεί υψηλής επικινδυνότητας έργο πάνω σε ενεργό ρήγμα, σε ρήγμα δηλαδή που έχει δώσει ή μπορεί να δώσει σεισμούς στο ερχόμενο διάστημα. Αν χωροθετούνταν για παράδειγμα χώρος υγειονομικής ταφής απορριμμάτων σε τέτοιο σημείο θα ήταν κάκιστη πρακτική καθώς υπάρχει πιθανότητα να διαρραγεί το στρώμα που αποτρέπει στα υπολείμματα να πάνε στα βαθύτερα στρώματα του εδάφους. Αντίστοιχα δεν είναι δυνατόν να κατασκευαστεί εκεί νοσοκομείο». Χρήσιμη είναι η βάση δεδομένων ασφαλώς και για την χάραξη αντισεισμικής πολιτικής.

Παρά την συνεχή έρευνα, πολλά από τα ενεργά ρήγματα ακόμα δεν τα γνωρίζουμε. «Τα μεγάλα ρήγματα είναι μέσα (σ.σ. στο χάρτη). Τα μικρότερα όμως, ιδίως αυτά στο θαλάσσιο χώρο αποτελούν πρόβλημα, γιατί πολλά δεν φτάνουν στην επιφάνεια. Ο θαλάσσιος χώρος είναι πολύ δύσκολος στην έρευνα. Υπάρχουν περιοχές με τεράστια κενά και δυστυχώς με την κρίση έφυγαν από την Ελλάδα οι επιστήμονες που θα τα μελετούσαν όλα αυτά».

(Λίνα Γιάνναρου / Η ΚΑΘΗΜΕΡΙΝΗ, 28.08.2024, https://www.kathimerini.gr/society/563192197/poy-vriskontai-ta-energa-rigmata-tis-elladas)

# ΕΝΔΙΑΦΕΡΟΝΤΑ - ΓΕΩΛΟΓΙΑ

**Erosion suspected in collapse of Utah's popular Double Arch rock formation**

Erosion suspected in collapse of Utah's popular Double Arch rock formation

A beloved and unique geologic feature in Utah's Glen Canyon National Recreation Area is no more following the collapse this week of the Double Arch sandstone formation in Utah, U.S. parks officials have confirmed.

Erosion is the suspected culprit in Thursday's collapse of the arch -- a hole formed in the 190-million-year-old sandstone rock situated along Lake Powell, the National Parks Service announced.

The formation was sometimes referred to as the Toilet Bowl, the Crescent Pool and the Hole in the Roof.

No one was hurt during the collapse at Rock Creek Bay, Utah, located about 300 miles east of Las Vegas.

The Double Arch has been subject to spalling and erosion from weather, wind and rain since its formation in the late Triassic to early Jurassic periods.

Changing lake water levels and the effects of wave action are also suspected of contributing to the ultimate collapse of the arch, according to Glen Canyon National Recreation Area Superintendent Michelle Kerns.

"This event serves as a reminder of our responsibility and need to protect the mineral resources surrounding Lake Powell," she said. "These features have a life span that can be influenced or damaged by manmade interventions.

"While we don't know what caused this collapse, we will continue to maintain our resource protection efforts on Lake Powell for future generations to enjoy. Please enjoy our resources but leave no trace," Kerns said.

(Don Jacobson / TERRA DAILY NEWS ABOUT PLANET EARTH Aug 10, 2024, https://www.terradaily.com/reports/Erosion_suspected_in_collapse_of_Utahs_popular_Double_Arch_rock_formation_999.html)

## Coastal Groundwater Salinization: A Looming Threat to Water Security in the Era of Climate Change

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### 1. Introduction

Groundwater resources form important reservoirs widely exploited for domestic, agricultural, industrial and tourist needs (Villholth, 2006; Custodio, 2010). However, coastal aquifers remain exceptionally vulnerable to salinization due to a variety of natural and anthropogenic factors (Mastrocicco and Colombani, 2021). As a hydrogeologist and Ph.D. candidate in Geology, my research focuses on the assessment of hydrogeochemical processes inducing groundwater salinization in coastal regions under climate change. My experiences in this area have enabled me to understand the complexity of the processes involved in the salinization of coastal groundwater and the challenges involved in developing sustainable management strategies to mitigate its impacts. In this paper, I will outline the sources and mechanisms of groundwater salinization in coastal regions, and the implications of these processes for water resource management.

### 2. The Sources, Mechanisms, and Implications of Coastal Groundwater Salinization

The salinization of coastal groundwater is a complex process that is influenced by various factors such as seawater intrusion, anthropogenic activities, and climate change. Seawater intrusion is the primary cause of salinization, resulting from the movement of seawater into the coastal aquifer due to over-pumping, excessive groundwater abstraction, and sea-level rise caused by climate change (Santos et al., 2014). Anthropogenic activities such as agricultural practices, urbanization, and industrial activities can also contribute to salinization by introducing pollutants and contaminants into the coastal groundwater system. Furthermore, groundwater salinization arises from complex hydrogeochemical processes, namely cation exchange, mineral dissolution, and redox reactions. Cation exchange occurs when saltwater infiltrates the aquifer, displacing the existing freshwater cations with salt cations. This exchange of cations leads to an overall increase in the salinity of the groundwater. Mineral dissolution is another key process in groundwater salinization. When saltwater comes into contact with minerals such as gypsum and halite, it dissolves them, releasing their constituent ions into the water. Additionally, redox reactions, like the oxidation of organic matter, can also contribute to the increased salinity of groundwater.

The salinization of coastal aquifers has significant consequences for water security and human well-being. It leads to the degradation of freshwater resources, making them unsuitable for human consumption and agricultural use. This, in turn, can have negative impacts on food security and livelyhoods, particularly for coastal communities that depend on groundwater for their daily needs.

Mitigating the salinization of coastal groundwater requires sustainable water management strategies that take into account the complex hydrological, hydrogeological, and geochemical processes involved in coastal aquifer systems. These strategies should be based on a thorough understanding of the aquifer's physical and chemical characteristics, as well as its response to climate change.

### 3. Conclusion

The salinization origin of coastal groundwater under climate change and anthropogenic activities is a looming threat to water security in the era of climate change. Addressing this challenge requires a holistic approach that considers the complex interactions between natural and human systems. Addressing the issue requires a coordinated effort by governments, local communities, and scientists to understand the origins of salinization and develop appropriate mitigation strategies. By pushing the boundaries of what is possible and rallying the collective will to drive change, we can forge a new path towards water security, one that inspires and captivates the world.

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# ΕΝΔΙΑΦΕΡΟΝΤΑ - ΛΟΙΠΑ

## Stone Age builders had engineering savvy, finds study of 6000-year-old monument

**A survey of the Dolmen of Menga suggests that the stone tomb's Neolithic builders had an understanding of science.**

Archaeologists used laser scans and diagrams from earlier excavations to investigate the construction of the Dolmen of Menga. Credit: Cavan Images/Getty

The Neolithic farmers and herders who built a massive stone chamber in southern Spain nearly 6,000 years ago possessed a good rudimentary grasp of physics, geometry, geology and architectural principles, finds a detailed study of the site.

Using data from a high-resolution laser scan, as well as unpublished photos and diagrams from earlier excavations, archaeologists pieced together a probable construction process for the monument known as the Dolmen of Menga. Their findings, published on 23 August in *Science Advances*[1], reveal new insights into the structure and its Neolithic builders' technical abilities.

The dolmen pre-dates the main stone circle at Stonehenge in the United Kingdom by about 1,000 years, but the construction process described in the study would have involved similar techniques and demanded a similar level of engineering.

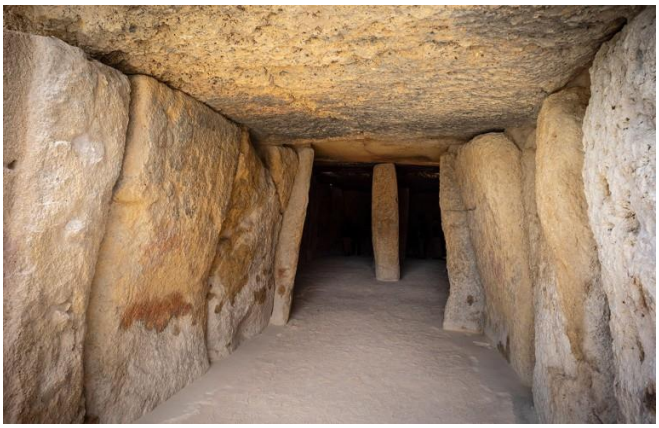
"These people had no blueprints to work with, nor, as far as we know, any previous experience at building something like this," says study co-author Leonardo García Sanjuán, an archaeologist at the University of Seville in Spain. "And yet, they understood how to fit together huge blocks of stone" with "a precision that would keep the monument intact for nearly 6,000 years".

"There's no way you could do that without at least a basic working knowledge of science," he adds.

### Super-solid structure

To construct the dolmen, its builders transported 32 giant stone blocks from a quarry around one kilometre away and used them to form the walls, pillars and roof of a massive chamber measuring around 28 metres long, 6 metres wide and 3.5 metres high. The largest of these blocks, one of the capstones that forms part of the roof, is 8 metres long and weighs an estimated 150 tonnes. By comparison, the biggest stone used to build Stonehenge weighs about 30 tonnes.

Transporting these huge slabs from the quarry to the site without breaking them would have required particular care, the researchers say, particularly with the soft sandstone used for the roof. They suggest that this could have been done using specially built wooden tracks to reduce friction as the stones were dragged along, much as the builders of Stonehenge are thought to have done.



The dolmen's stones are fitted together with high precision, suggesting that the people who built the tomb understood principles of science and engineering. Credit: Album/Alamy

Another task that demanded precision and skill was finessing the upright slabs into sockets carved 1.5 metres deep into the bedrock. The laser scans revealed that the builders used counterweights and ramps to move the uprights carefully into the sockets, tilting them at precise, millimetre-scale angles. The stones were carved into facets that meant they locked against their neighbours when the weights and ramps were removed.

"I've always been amazed by the engineering skills needed to build this dolmen," says Michael Parker Pearson, an archaeologist at University College London. "This paper reveals just how precisely that has to have been done, with an extraordinary eye on dimensions and angles. With such big stones, they could not have afforded to make mistakes when manoeuvring them into position. If even just one was a few centimetres out, that would have been hard to correct once an upright stone was set in its trench."

Parker Pearson adds that the prehistoric engineers' understanding of physics and geometry resulted in a 'super-solid monument'. "It's the sort of thing we see at Stonehenge a thousand years later, with the mortise and tenon joining of uprights and lintels."

But unlike Stonehenge, the Dolmen of Menga is in a seismically active, earthquake-prone area. Despite this, after nearly 6,000 years, the stonework is still snug and secure, says García Sanjuán. "These people really knew what they were doing."

*doi: https://doi.org/10.1038/d41586-024-02776-w*

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(Roff Smith / Nature, 23 August 2024, https://www.nature.com/articles/d41586-024-02776-w)

## Early science and colossal stone engineering in Menga, a Neolithic dolmen (Antequera, Spain)

**José Antonio Lozano Rodríguez, Leonardo García Sanjuán, Francisco J. Jiménez-Espejo, Antonio M. Álvarez-Valero, Jesús M. Arrieta, Eugenio Fraile-Nuez, Antonio García-Alix, Raquel Montero Artus, and Francisco Martínez-Sevilla**

**Abstract**

Megaliths represent the earliest form of monumental stone architecture. The earliest megalithic chambers in Europe appeared in France in the fifth millennium BCE. Menga is the oldest of the great dolmens in Iberia (approximately 3800 to 3600 BCE). Menga's capstone #5 weighing 150 tons is the largest stone ever moved in Iberia as part of the megalithic phenomenon and one of the largest in Europe. The research presented here proposes a completely innovative interpretation of how this colossal monument was built. It comprises a geoarchaeological analysis encompassing three major components: (i) the angles of the planes of each stone, (ii) the stratigraphic polarity of each structural element, and (iii) the depth of the foundations. Our results show that Menga is a unique example of creative genius and early science among Neolithic societies. It was designed as a completely original engineering project, for which we know of no precedents in Iberia.

**INTRODUCTION**

Megaliths are structures made of large stones and are found in variety of regions throughout the world. In Late Prehistoric Europe, megalithic monumentality was a widespread phenomenon, spanning 3000 years, from the mid-fifth (France) to the late second millennia (Balearic Islands, Corsica, Sardinia, Greece). Megaliths, the earliest stone-made monumental constructions, framed and embodied profound social and ideological messages in a long-lasting and visible manner. The longevity of the large stones (as opposed to wood) and their visual impact on the surrounding landscapes suggest that long-term persistence was a major driver in their construction (*1*, *2*). As monuments endowed with deep social significance and cultural memory, megaliths often present extended biographies, spanning several millennia of use, frequentation, and transformation, which makes them one of the most enduring and fascinating phenomena in human history (*3*).

As Colin Renfrew noted half a century ago (*4*), large megaliths demanded the mobilization of a substantial labor force and the deployment of advanced engineering and architectural expertise in stone construction never attained before. Megalithic monuments are prominent and pervasive features raising a wide interest in contemporary society. Yet, multidisciplinary studies of early megalithic engineering supported by archaeological, petrological, stratigraphic, and geological evidence have been quite rare, although some exceptions exist (*5*–*9*). This is surprising, since technology mediates human interaction with the world, and its knowledge is essential to comprehend past societies.

Here, we examine a great Neolithic engineering feat: the Menga dolmen, Iberia's largest megalithic monument. As listed by UNESCO, the Antequera megalithic site includes two natural formations, La Peña de los Enamorados and El Torcal karstic massif, and four major megalithic monuments: Menga, Viera, El Romeral, and the one recently discovered at Piedras Blancas, at the foot of La Peña de los Enamorados (*10*) (Fig. 1A). Menga, built between approximately 3800 and 3600 BCE, is the earliest of all four megaliths and stands out on account of its enormous size and the colossal weight of its stones (Fig. 1, B to E). Its extraordinary dimensions demanded sophisticated design and planning, a large mobilization of labor, as well as perfectly executed logistics. Because of the originality of design, with three preserved pillars aligned with the central axis of the monument, and the massive size of the stones, Menga was already acknowledged as a groundbreaking discovery shortly after the first explorations were undertaken in the 1840s (*11*).


**Fig. 1. Location and interior of the Menga dolmen.**

(**A**) Panoramic view of the city of Antequera, with the location of the Cerro de la Cruz quarry, the Viera and Menga dolmens, the *Tholos* of El Romeral, and the Piedras Blancas at La Peña de los Enamorados. (**B**) Entrance to Menga. (**C**) Interior of the dolmen from the second pillar. (**D**) Interior of Menga, and three pillars currently preserved. (**E**) Dolmen chamber. Credits: (A) and (B) correspond to the main author; (C) and (E) were provided by the Antequera Dolmens Archaeological Site on behalf of the Andalusian Regional Government (Miguel Ángel Blanca de la Rubia); (D) (*61*).

Like most early megaliths, Menga has never been analyzed from an interdisciplinary perspective combining archaeological, petrological, and stratigraphic (sedimentological and paleontological) evidence. Therefore, the challenges involving its construction have not been evaluated as an engineering problem. This paper proposes a revolutionary interpretation concerning the way this remarkable monument was built, based on a geoarchaeological analysis of the angles of the planes of each stone, the stratigraphic polarity of each structural element, and the depth of the foundations relative to the original bedrock level. Our hypothesis represents a completely original take on hitherto unresolved critical problems, such as why was the monument largely embedded in the ground, or how were the massive stones, made on soft and moderately soft rocks, placed inside the monument, or what was the purpose of the tumulus. Answers to these questions are critical to understand how a building made using supposedly "primitive" technology has successfully stood on its feet for almost 6000 years, thus becoming one of the most remarkable known examples of Neolithic architecture. Our findings run entirely counter to the idea of "primitiveness" or "rudeness" (*12*) that for a long time has underpinned both the popular and scientific understanding of Neolithic societies.

…

(Science Advances, 23 Aug 2024, Vol 10, Issue 34, DOI: 10.1126/sciadv.adp1295)

https://www.science.org/doi/10.1126/sciadv.adp1295

# ΗΛΕΚΤΡΟΝΙΚΑ ΠΕΡΙΟΔΙΚΑ

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Geoengineer.org is thrilled to announce the launch of its new Video Platform, which enhances our resource offerings with 1,000+ videos that our team has curated or created over the years. This new platform provides invaluable visual content to professionals, researchers, and students in the field. It streamlines access to geotechnical videos that were previously scattered across various websites and social media networks, and archives it in a way that is easy to navigate. Read More

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Snowy Hydro released an update regarding the state of its 2,000-ton, 134m-long tunnel boring machine (TMB), which has been stuck in hard rock for a month. Read More

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DCOdes.io **Software** 8 Jul 2024

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George A Athanasopoulos **resource** 29 May 2024

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**IGS NEWSLETTER – August 2024**

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**Research Articles**

Mitigation of lateral slope movement and soil improvement using the vacuum-PVD scheme, S. Soralump, N. Koirala, S. Phakdimek, 31(4), pp. 372–387

Laboratory preparation and tensile signal response of sensor-enabled piezoelectric geobelt, Y. Rao, J. Ye, H. Wang, J. Wang, G. Ding, J. Ni, 31(4), pp. 388–397

Machine-learning modelling of tensile force in anchored geomembrane liners, K. V. N. S. Raviteja, K. V. B. S. Kavya, R. Senapati, K. R. Reddy, 31(4), pp. 398–414

Gas flow characteristics of GCL under distortions, wet-dry cycles, and hydrating fluids, V. Khan, S. Rajesh, 31(4), pp. 415–428

Woven geotextile permeability under uniaxial and laterally constrained conditions, K. Y. Li, X. W. Tang, M. L. Fei, W. L. Chen, J. X. Liang, Q. Q. Xiang, 31(4), pp. 429–439

Investigation on the long-term strain of geogrid in GRPS embankment under cyclic loading, K.-F. Liu, K.-R. Xue, M.-J. Wen, L. Wang, 31(4), pp. 440–454

Reliability analysis of compacted embankment with geocomposite under infiltration, R. Showkat, G. L. Sivakumar Babu, 31(4), pp. 455–468

Strain assessment of polyethylene pipes in dense sand subjected to axial displacement, A. Reza, A. S. Dhar, M. Rahman, 31(4), pp. 469–486

Transport of heavy metal contaminants in a composite liner under non-isothermal condition, W. Jiang, S. Ge, C. Feng, J. Li, 31(4), pp. 487–504


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Editorial Board, Page ii

Centrifuge shaking table tests on tiered reinforced soil retaining walls subjected to the excitations of near-field ground motions, Cheng Fan, Xuejun Liu, Yuting Zhang, Xiaoyu An, Huabei Liu, Pages 343-354

Effect of welding parameters on properties of HDPE geomembrane extrusion welds, R. Kerry Rowe, M. Mouhamed Ali, Pages 355-367

Innovative design of self-adhesive basalt fiber mesh geotextiles for enhanced pavement crack resistance, Zehua Zhu, Peng Xiao, Aihong Kang, Changjiang Kou, ... Zhiwei Ren, Pages 368-382

Effect of a lateral drainage layer on leakage through a defect in a geomembrane overlain by saturated tailings, Jiying Fan, R. Kerry Rowe, Pages 383-395

Experimental study on the effect of temperature on HDPE geomembrane/geotextile interface shear characteristics, Hai Lin, Xiangyu Gong, Yifan Zeng, Chuangbing Zhou, Pages 396-407

Self-healing capacity of GCLs under simulated field conditions, Jinchun Chai, Xiaoxiao Zhu, Jixiang Nie, Takenori Hino, Pages 408-420

Performance of eccentrically loaded strip footings on geocell-reinforced soil, Sarper Demirdöğen, Ayhan Gürbüz, Kaan Yünkül, Pages 421-434

Exploring the influence of size-related factors on geocell-reinforced soil response using coupled continuum-discontinuum analysis, Haibo Wang, Ge Gao, Mohamed A. Meguid, Yi Pik Cheng, Lulu Zhang, Pages 435-450

An analytical solution for the settlement of encased stone columns beneath rigid footings, Jorge Castro, Jon Justo, Marina Miranda, Pages 451-464

Assessment of the functionality of geotextile and granular filter systems in hydraulic engineering in case of iron ochre clogging tendency, Lukas Tophoff, Berit Finklenburg, Eva-Lotte Schriewer, Holger Schüttrumpf, Frank Heimbecher, Pages 465-478

Behavior of geosynthetic-encased stone column reinforced foundation under freeze-thaw cycles, Zi-Ang Gu, Chungsik Yoo, Jian-Feng Chen, Pages 479-493

Seismic time-history analysis of block-faced reinforced-soil retaining wall based on pseudo-dynamic method, Liang Lu, Bo Chen, Peng Liu, Zongjian Wang, Katsuhiko Arai, Pages 494-510

Full-scale accelerated testing of geogrid-reinforced inverted pavements, Xi Jiang, Fengshou Zhang, Baoshan Huang, Hani Titi, ... Zhiqiang Cheng, Pages 511-525

Macro-microscopic mechanical behavior of geogrid reinforced calcareous sand subjected to triaxial loads: Effects of aperture size and tensile resistance, Zhao-gang Luo, Xuan-ming Ding, Qiang Ou, Yi-wei Lu, Pages 526-541

Seismic performances of the wrapped retaining wall backfilled with polypropylene fiber reinforced rubber-sand mixture, Zhuang Haiyang, Yang Fan, Pan Chen, Cheng, Yingyao, Pages 542-553

Mechanism of air-boosting and its effects on vacuum consolidation, Jinchun Chai, Yafei Qiao, Wenqi Ding, Hehua Zhu, Pages 554-561

Enhanced drainage performance of PVF-wicking geosynthetics: Development and experimental assessment, Xiaohui Sun, Ziyi Chen, Fan Chen, Silin Wu, ... Guilin Chen, Pages 562-573

Experimental evaluation of geosynthetic-modular block connection loads, F.H.M. Portelinha, P.V.C. Figueiredo, J.G. Zornberg, Pages 574-584

Electroosmosis of gold tailings under multiple electrokinetic geosynthetics electrodes, Changbo Du, Ben Niu, Fu Yi, Meng Wang, Xinqi Jiang, Pages 585-597

Using strain hardening to predict the stress crack resistance of unaged and aged smooth black HDPE geomembranes, M. Ali, R. Kerry Rowe, F.B. Abdelaal, Pages 598-611

Seismic bearing capacity of strip footings placed on reinforced soil slopes using slip line method, Majd Tarraf, Ehsan Seyedi Hosseininia, Pages 612-625

Introduction to a novel geotextile tube connection construction method: A case study of test site and field application, Hyeong-Joo Kim, Myoung-Soo Won, Shamsher Sadiq, Tae-Woong Park, ... Tae-Eon Kim, Pages 626-634

Numerical modelling of reinforced fill over a void considering rate-dependent stiffness of the reinforcement, Fahimeh M. Naftchali, Richard J. Bathurst, Pages 635-653

Experimental investigation of the geometry of geocell on the performance of flexible pavement under repeated loading, Sayanti Banerjee, Bappaditya Manna, J.T. Shahu, Pages 654-670

Evaluation of arched EPS block and geocell inclusions in trench backfill for protection of buried flexible pipes, S.N. Moghaddas Tafreshi, N. Joz Darabi, M. Azizian, B.C. O'Kelly, A. Faramarzi, Pages 671-689

2D failure mechanisms and failure modes of a new type of geotextile tubes used for river dikes, Berit Finklenburg, Elena-Maria Kloprie, Holger Schüttrumpf, Pages 690-703

Effective stiffness matrix calculation of geocell layer and reinforcement mechanism analysis of geocell reinforced embankment, Changjun Yin, Jingjing He, Ahmed Adam Khalifa Gowi, Zhuo Li, Chenhang Zhou, Pages 704-724

New simple method for calculating large-strain consolidation settlement of layered soft soils with horizontal drains and vacuum preloading with comparison to test data, Ze-jian Chen, Peng-lin Li, An Li, Jian-hua Yin, Ding-bao Song, Pages 725-735

Investigation on the static performance of geogrid reinforced aeolian sand railway embankment: Field test and discrete element simulation, Wei Du, Rusong Nie, Yanlu Qi, Bo Ruan, Fan Mo, Pages 736-752

Experimental study on the improvement of sludge by vacuum preloading-stepped electroosmosis method with prefabricated horizontal drain, Xiaoya Bian, Haodong Yang, Hui Liu, Zhiyao Xu, Rongjun Zhang, Pages 753-761

Transport parameters for PFOA and PFOS migration through GCL's and composite liners used in landfills, Farah B. Barakat, R. Kerry Rowe, David Patch, Kela Weber, Pages 762-772

Locating leaks in geomembrane-lined ponds using the electrical leak location method: Case histories, Priscila Zidan, Matthew Kemnitz, Elisabeth Ritter, Pages 773-777

Optimum tack coat rate for different asphalt geosynthetic interlayers to achieve optimum shear bond strength, N.S. Correia, M.P.S. Silva, A. Shahkolahi, Pages 778-789

Three-dimensional numerical analysis of large-scale horizontal square anchors in geogrid-reinforced sand, Sougata Mukherjee, G.L. Sivakumar Babu, Pages 790-799

Long-term hydraulic conductivity of bentonite-polymer geosynthetic clay liners, Hanrui Zhao, Dong Li, Kuo Tian, Pages 800-812

Plastic shakedown limit of geosynthetic reinforced coarse-grained soil: Experiments and prediction model, Dongjie Zhang, Kai Cui, Qionglin Li, Shangchuan Yang, ... Jinhong Xie, Pages 813-827

Influence of secondary reinforcements on the behavior of geosynthetic reinforced soil walls, Fuxiu Li, Wenhao Guo, Yewei Zheng, Pages 828-840

Predictive model for the interface bond strength of geosynthetic-reinforced asphalt layers, M.P.S. Silva, J.G. Zornberg, N.S. Correia, Pages 841-854

Evaluation of dynamic soil stress distribution in GRS bridge abutments subjected to cyclic loading, Yafei Jia, Chuan-Bao Xu, Jun Zhang, Jun-jie Zheng, Yewei Zheng, Pages 855-869

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