INTERNATIONAL SYMPOSIUM
PRESERVATION OF MONUMENTS & HISTORIC SITES
SEPTEMBER 2026 | ATHENS, GREECE

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Αρ. 204 – ΟΚΤΩΒΡΙΟΣ 2025

SIMSG ISSMGE

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ISSN: 2732-7248

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Case Study: The Frank Slide (Frank, AB, 1903)

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Author's Note: This piece is dedicated to the memory of the victims of the Frank Slide of April 29th, 1903.

Introduction

Only two factors kept the Frank Slide from being a site to behold as it roared down Turtle Mountain's eastern flank in southwest Alberta on April 29th, 1903. One was timing. The disaster played out at 4:10 AM, when even the Canadian frontier's hardy settlers were mostly still asleep. The other was tragedy. Most eyewitnesses in the best position to see or hear the monumental rockfall wound up entombed beneath it. Scholars and geo-professionals have spent the century and a quarter since the gargantuan slide studying its mechanics and the likelihood of further slides on Turtle Mountain's slopes (Anderson 1986).

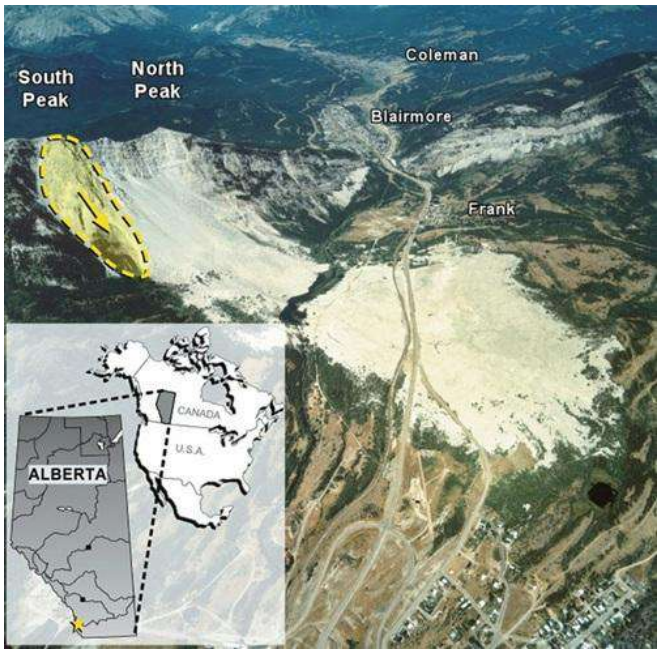

Image 1: Turtle Mountain, the mammoth debris fan from its slide, and a map of its location in Canada.
Source: Froese et al. (2009).

First Nations Lore and Geologic Background

The region's First Nations residents, as Canada's Indigenous peoples are known, had perceived the natural threat from Turtle Mountain long before 1903. Generations of the Blackfoot and Kootenay tribes had long refused to camp at the base of the peak, named because its profile resembled a sleeping turtle. They maintained in their folklore that the turtle would one day awaken and raise its head, bringing the mountain tumbling down. The First Nations peoples' name for Turtle Mountain translated to "the mountain that moves," which almost surely reflected the experience of previous slides. The mountain had been primed for such events since its formation during the Laramide Orogeny roughly 50 to 75 million years ago. The twisting, wrenching process of orographic uplift elevated the new peak about 3,000 feet (915 m) above the surrounding Crowsnest River valley, known as Crowsnest Pass. The orogeny and regional faulting eventually left the Livingstone Formation, a relatively strong stratum of Mississippian limestone roughly 1,150 feet (350 m) thick, lying above the Kootenay Formation, a series of considerably weaker strata of Cretaceous shale, sandstone, and coal about 655 feet (200 m) thick (Anderson 1986, Benko and Stead 1998, Langenberg et al. 2007, Leckie et al. 2021, McConnell and Brock 1904, Moreno et al. 2011, USGS 2025).

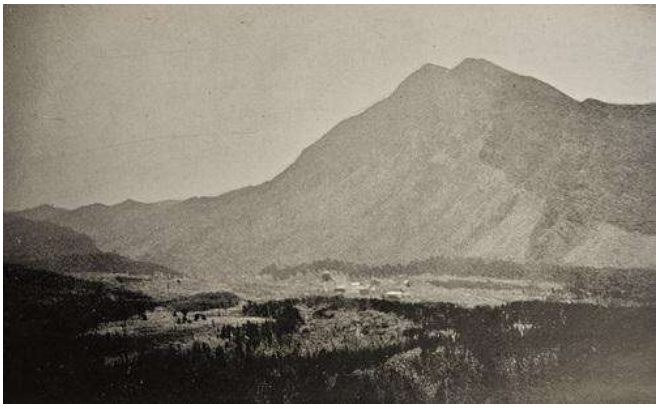

Image 2: Turtle Mountain and Crowsnest Pass before the 1903 slide.
Source: McConnell and Brock (1904).

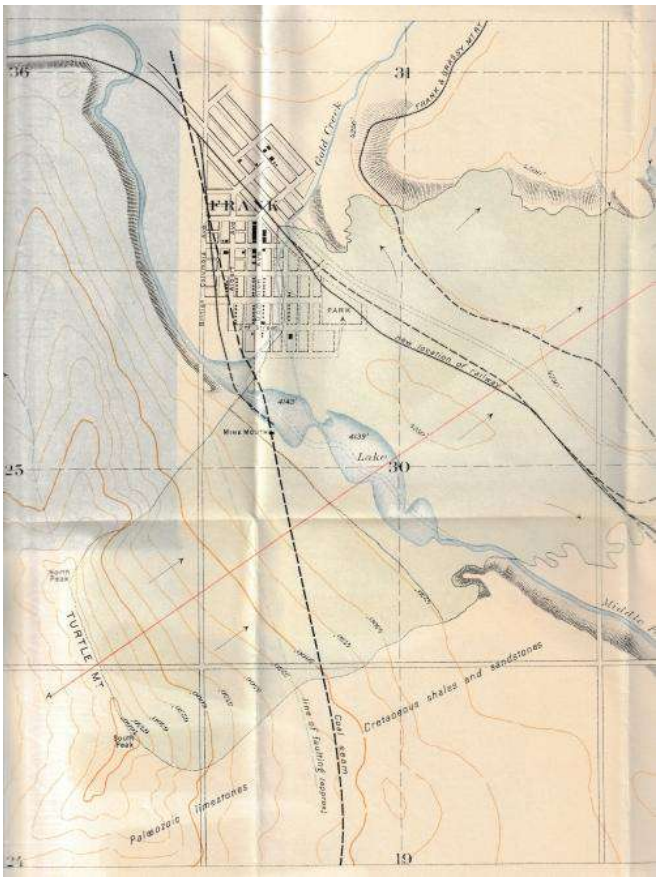

Image 3: Topographic map of Turtle Mountain, Crowsnest Pass, and the slide, 1903.
Source: McConnell and Brock (1904).

From the start, Turtle Mountain was tenuously stable at best. Its subsurface geology consists of crumpled rock strata riddled with faults, forming a fault-propagation fold. This structure manifests itself at the surface as the Turtle Mountain Anticline, the hinge of which defined the mountain's crest as of early 1903. The Livingstone Formation limestone along the hinge has a lower, more widely scattered Geological Strength

Index (GSI) than it does elsewhere on Turtle Mountain due to more closely spaced jointing and a lower unconfined compressive strength. West of the hinge, the formation dips 50° westward; east of the hinge, it dips 70° eastward. Post-slide studies would note two clearly defined joint sets through the hinge limestone, intersecting at a 97° angle. These fissures further complicated Turtle Mountain's geologic situation by allowing water to seep in; freeze-thaw cycles then expanded them. The Turtle Mountain Fault, a thrust fault between the Livingstone limestone and the Kootenay sedimentary layers, only exacerbated the mountain's stability woes. Multiple glaciations and the Kootenay Formation's 82° westward dip left Turtle Mountain with a unique bilinear profile. In early 1903, the lower 800 feet (245 m) of the mountain's 3,000-foot (915 m) prominence had a slope of about 30°, but above that, the mountainside had a slope of about 45° (Langenberg et al. 2007, Leckie 2021, McConnell and Brock 1904, Moreno et al. 2011).

Image 4: Turtle Mountain Anticline as seen several miles south of Crowsnest Pass.
Source: Read et al. (2005).

Pioneers and Coal

Clearly, the First Nations peoples' fear about Turtle Mountain were geologically well-founded. Pre-1903 photos of the mountain show slight but definitive "pistol butt" trees along its eastern face and gaps in its vegetative cover, both indicative of current and historical rockfalls and slope movement. However, the First Nations peoples, and their prescience about Turtle Mountain, were driven out of Crowsnest Pass in the late 19th century as settlers reached the Canadian Rockis. The pioneers first noticed the area that would become Frank in the 1870s, when some discovered hot, sulfur-rich springs there. Developers eventually constructed a resort around these springs, touting their supposed medicinal benedits, but a stronger economic incentive was needed to attract more permanent settlement to Crowsnest Pass. That came shortly when the Canadian Pacific Railway laid tracks through the area. Further pioneers swiftly rode the rails to southwest Alberta, eager to find "gold in them hills" (Anderson 1986, Cruden and Martin 2007, McConnell and Brock 1904).

Instead, in 1900, a businessman exploring the region located an outcrop of one of the Kootenay Formation coal seams that ran beneath Turtle Mountain. Word of the vein soon reached Henry Luplin Frank, a Montana mineral magnate. He recognized that a coal mine promised steady, long-term profits and could anchor a sizable community. Accordingly, Frank formed the Canadian American Coal and Coke Company to work the seam, and mining began in the spring of 1901. By that fall, the company's drifts and chambers extended nearly a quarter mile into the lucrative, 13- to 18-foot-thick (4 to 5.5 m) seam. Frank advertised the jobs his mine offered and made sure local aspiring businessmen heard that a town would spring up there. The coal boom and the Canadian Pacific tracks fueled a rapid, startling transformation. Over the next two years, the modest frontier settlement bloomed like wild grasses on the Canadian prairie. Unsurprisingly, it took the name of its founder – Frank (Alberta 2025, Anderson 1986).

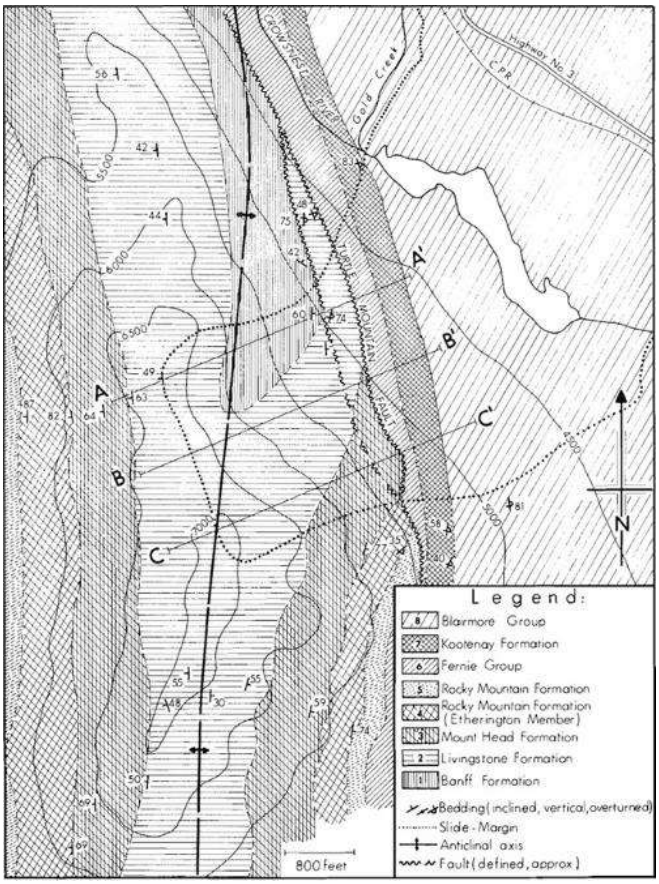

Image 5: Aerial geologic map of Turtle Mountain and Crowsnest Pass.
Source: Cruden and Krahn (1973).

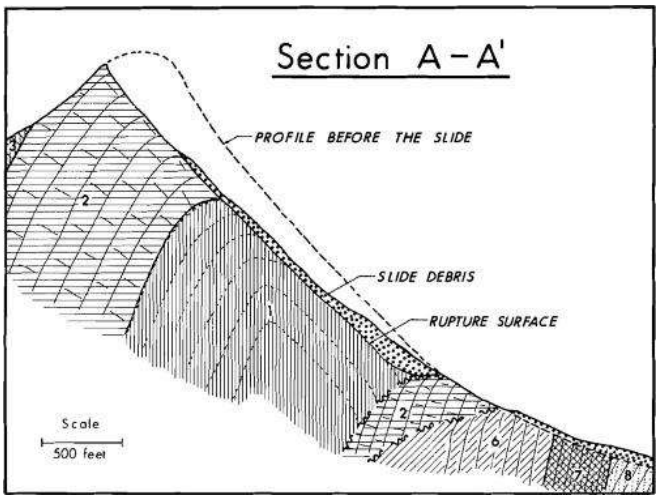

Image 6: Cross-section A-A' from geologic map in Image 5.
Source: Cruden and Krahn (1973).

The Town of Frank

By 1903, roughly 600 people lived in Frank permanently alongside several hundred transient residents such as miners and ranchers. While the town was no metropolis, nor was it

the "Wild West" outpost replete with shady characters that some historical accounts suggest. Visitors disembarking in Frank from a Canadian Pacific train could stay in one of three hotels. Those who liked what they saw and decided to put down roots – and there were many – could shop at two dry goods stores and two clothing shops. Two doctors, a dentist, and a well-stocked drug store were available for their medical needs, and an attorney and insurance agent could cover other serious concerns. The town bank's deposits were locked in a safe guarded by its banker, who lived on the premises, and his four revolvers. Other businesses included a shoe store, a jeweler, wine and cigar shops, a fledgling newspaper, and a photographer, who would play a key role in capturing the slide's aftermath for posterity (Anderson 1986).

Image 7: The Canadian American Coal and Coke Company's mine at the base of Turtle Mountain, early 1900s. Note the slight "pistol butt" curvature of the trees.
Source: McConnell and Brock (1904).

Most denizens of Frank had built their own homes and lived with their families; some had as many as 7 children. A few mine employees and their families lived in company cottages, while others, most likely bachelors, lived in a boarding house. Tents on the Crowsnest River flats just outside town housed workers building a rail spur north from the Canadian Pacific's main line. A theater gave the good townspeople the chance to unwind in their free hours; so, to the chagrin of Frank's churches, did several saloons. Meanwhile, teachers in the two-story brick schoolhouse kept the town's youths on the straight and narrow. Police records suggest that Frank was a rather orderly place, as the worst offenses recorded there were cattle and horse theft. The village had never needed more than two police officers to keep the peace, and one was usually sufficient (Anderson 1986).

Image 8: Frank's school alongside a church and homes, early 1900s.
Source: Anderson (1986).

Problems within the Mountain

The most critical threat facing Frank in the early 1900s was far less visible than the occasional cattle rustler but far more menacing. Immediately south of town, Turtle Mountain was growing increasingly unstable. The alluvial fan accumulating at the mouth of Gold Creek, a local tributary of the Crowsnest River, had been diverting the river for years, causing the Crowsnest to slowly cut into the mountain's eastern base. Moreover, 1899, 1901, and 1902 were all unusually moist years in Crowsnest Pass, causing more severe freeze-thaw cycles that worsened the degradation of the Livingstone Formation limestone. Deeper within Turtle Mountain, the Canadian American Coal and Coke Company was steadily accelerating its mining operations. Its coal output skyrocketed from 15,000 tons (13,600 t) in 1901 to 160,000 tons (145,000 t) in 1902, and miners extracted a further 101,000 tons (91,600 t) in the first four months of 1903. Quick expansion made the mine's increasing output possible. By early 1903, its tunnels reached over a mile into Turtle Mountain. The mine's working face consisted of three massive vertical chambers 250 to 400 feet (75 to 120 m) high and 60 to 150 feet (18 to 45 m) long within the 13- to 18-foot-thick (4 to 5.5 m) Kootenay Formation coal seam (Anderson 1986, McConnell and Brock 1904).

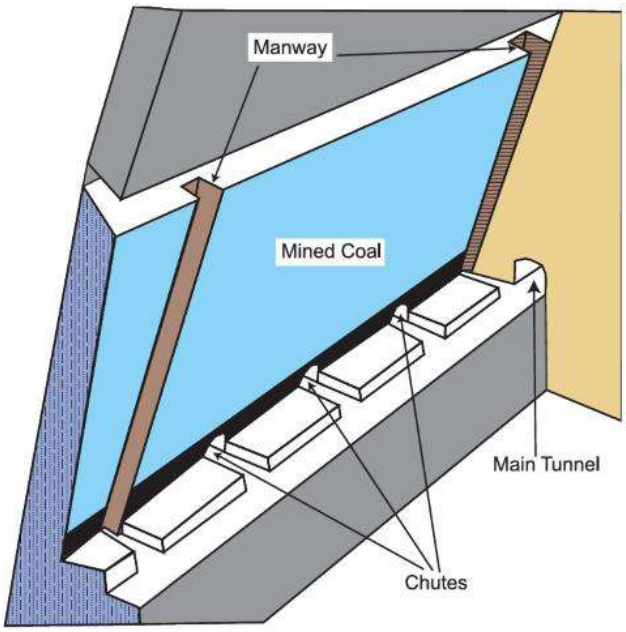

Image 9: Diagram of a coal mine working chamber within Turtle Mountain, 1903.
Source: Cruden and Martin (2007).

"When the timbers start talking, the miners start walking."

The thick cover of talus and vegetation on Turtle Mountain's eastern flank largely hid surface manifestations of its geological problems from view in Frank. No such camouflage blocked the view of miners toiling for H.L. Frank, though, and they reported ominous signs in the months leading up to the Frank slide. The newest section of the mine tunnel, extending 3,500 to 5,000 feet (1,065 to 1,525 m) into the mountain, exhibited frequent, troublesome squeezing. Coal in the mine's mammoth chambers was increasingly "running itself," or working loose from the vein without any mining effort. This reflected an increasing magnitude of stress relief within these chambers and, in turn, just how much stress was building up within Turtle Mountain's strata. Perhaps most ominously, the stout 16-inch timbers installed to brace the mine's workings were frequently twisted and splintered within a day of their installation. Miners noted that the issue was worst in the dead

of night, which corresponded to the region's lowest temperatures and induced the worst freeze-thaw cracking in the limestone. The failure of timber props in subsurface coal mines is a loud process, as peers of the Frank miners 2,000 miles away used to note in a darkly witty rhyme. The miners in northeast Pennsylvania's anthracite region all knew that "When the timbers start talking, the miners start walking" (Anderson 1986, Cruden and Martin 2007, McConnell and Brock 1904).

Image 10: Timbering in a subsurface anthracite mine in northeast PA, early 1900s.
Source: Underground Miners (2025).

Some Frank miners were indeed frightened enough by the talking timbers and other worrisome signs that they quit and walked off the job, but most kept working. The possibility of a massive geological failure at Turtle Mountain seemed remote, and the lure of profits was too sweet for the Canadian American Coal and Coke Company to resist. By then, H.L. Frank and his employees had fallen to some extent into the comfortable logical fallacy that since nothing had happened yet, nothing would. However, this calculus became increasingly shaky as April 1903 neared its end. Spring was finally reaching the Canadian Rockies, and ice within the joints of the Livingstone Formation limestone was beginning to melt, while ice along the joints' external faces remained frozen. As a result, the water had nowhere to drain, and pore pressures in the rock were increasing. Several unusually warm days at Turtle Mountain late that April exacerbated this freeze-thaw problem. The issue grew even worse on the night of April 28-29 as temperatures fell below 0 °F (-18 °C). Miners recalled this unseasonable cold snap as being more frigid than any night that winter. The rapidly increasing pace of mining within Turtle Mountain likely compounded the freeze-thaw issues. One final piece of the failure puzzle was a minor thrust fault spur off the Turtle Mountain Fault, which represented a built-in sliding surface at the peak's base. As April 28th, 1903 slipped into April 29th, Turtle Mountain was essentially standing up out of habit (Anderson 1986, Cruden and Krahn 1978, McConnell and Brock 1904).

The Frank Slide

The habit died hard at 4:10 the morning of April 29th when a wedge of limestone along Turtle Mountain underwent toppling, most likely due to freeze-thaw cycles. This failure cascaded into a rockfall avalanche, and the slide began. Most of Frank's inhabitants were still sound asleep, but enough were awake to paint a terrifying picture of what happened. A hotelkeeper, already well into his workday, heard a tremendous roar that sounded like steam escaping under high pressure. He sprinted to his door just in time to glimpse gargantuan boulders bounding mere feet from his establishment. Over at the mine, a train engineer shunting freight cars along a siding heard the cacophony of falling rock and opened his throttle wide. The avalanche let loose a wave of air that nearly tipped over his engine, but he and his crew escaped by the skin of their teeth. The same air blast blew doors open in the Frank mine and knocked the men and horses inside off their feet. So loud was the slide that it was heard 110 miles (175 km) away on the outskirts of Calgary (Alberta 2025, Anderson 1986).

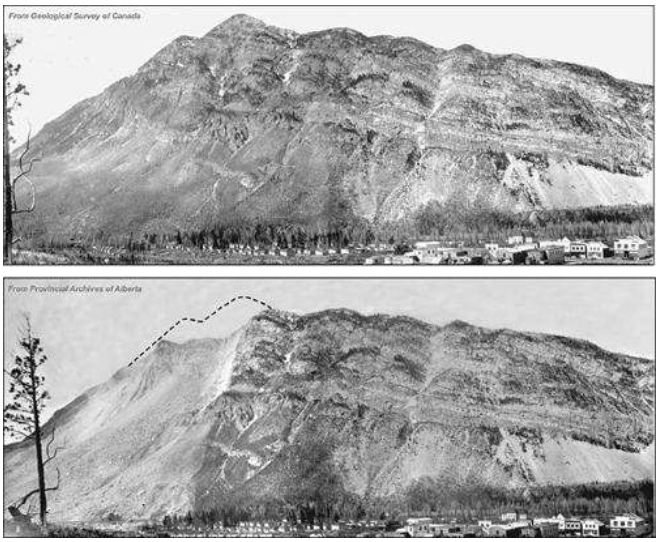

Image 11: Turtle Mountain before (T) and after (B) the Frank Slide.
Source: The Haunted Walk (2025).

The avalanche of rock followed right behind the air wave. The slide let loose approximately 58 million cubic yards (44 million m3) of Livingstone Formation limestone weighing roughly 120 million tons (110 million t). For comparison, this constitutes enough material to lay 1 foot (0.3 m) of new pavement along the entire Trans-Canada Highway from St. John's, Newfoundland, to Victoria, British Columbia. The falling rocks ranged in size from sand grains to 40 feet (12 m) in diameter, although most were between 3 and 20 feet (0.9 and 6 m). The rockslide thundered down the slopes of Turtle Mountain at up to 75 miles per hour (120 km/h) and hit the alluvium of the Crowsnest River with such force that the soil liquefied. This created a fluidized cushion that splattered the slide debris across the Crowsnest Pass (Alberta 2025, Anderson 1986, Cruden and Krahn 1973, McConnell and Brock 1904, Pletcher 2025, Read et al. 2005, Van Gassen and Cruden 1989).

Image 12: Turtle Mountain and the mammoth debris field from its slide looking northwest, spring 1903.
Source: McConnell and Brock (1904).

The Frank Slide lasted only about 90 seconds, but that was plenty of time for it to do its worst. When the slide finally halted, it had left a debris field ranging from 27 to 150 feet (8 to 45 m) thick, and on average about 45 feet (14 m) thick, over an area of 1.2 square miles (3 km2) in Crowsnest Pass. The fallen rock had dammed the Crowsnest River in several places, creating a chain of small lakes. The slide had also rerouted Gold Creek around the debris field's southern edge. Canadian Pacific wound up needing 17 days and a force of 1,100 men to rebuild 1.25 miles (2 km) of track obliterated by the rock avalanche. The Canadian American Coal and Coke

Company needed about a month to reopen its mine (Alberta 2025, Anderson 1986, Cruden and Krahn 1978, McConnell and Brock 1904, Read et al. 2005).

Image 13: Aerial view of the Frank Slide debris field, 1970s.
Source: Cruden and Krahn (1978).

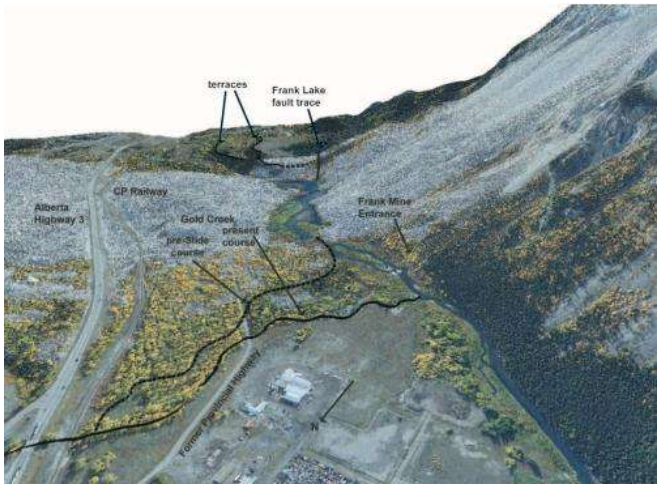

Image 14: Modern satellite view of Crowsnest Pass showing new lakes along the Crowsnest River and rerouting of Gold Creek resulting from the Frank Slide.
Source: Cruden and Martin (2007).

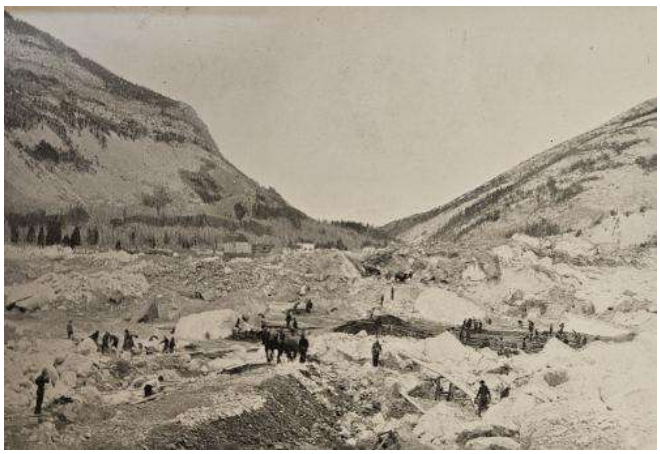

Image 15: Reconstruction of the Canadian Pacific Railway in Crowsnest Pass, spring 1903.
Source: McConnell and Brock (1904).

The popular impression that the Frank Slide wiped out its namesake town in its entirety is erroneous. The slide mainly impacted the southern end of town, and a large majority of Frank's 600-odd citizens were physically and financially unaffected by it. The slide blocked the Frank mine entrance, but in a fortunate turn of events, the crew on duty that morning successfully excavated a vertical tunnel through the Kootenay Formation coal seam and escaped. Still, the disaster's human consequences were grim, and at least one miner emerged from the rubble of Turtle Mountain only to find that his family had perished. The transient lifestyle of many who struck out for the Canadian Rockies in the early 1900s precludes a precise tally of victims of the Frank Slide, but the death toll was most likely around 90. The debris field was so massive that only 13 bodies were initially recovered, cruelly denying victims' relatives even the opportunity for closure. In 1922, a highway construction crew in the Crowsnest Pass excavated the remnants of a home and 6 more bodies, which were appropriately interred. Today, approximately 70 victims of the Frank Slide remain buried in the debris field (Anderson 1986).

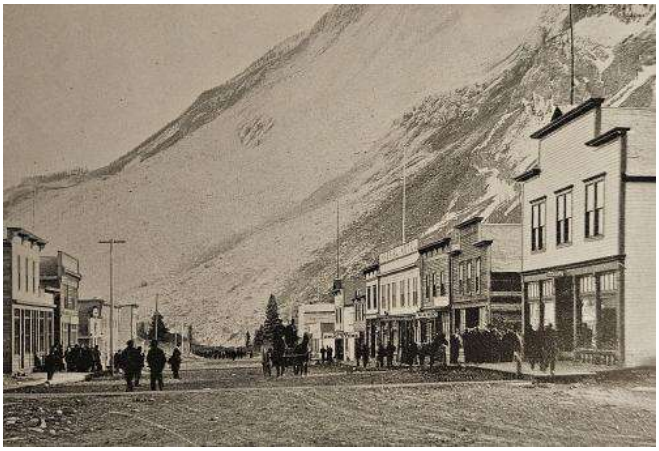

Image 16: View of the Frank Slide scarp from downtown Frank, spring 1903.
Source: McConnell and Brock (1904).

Initial Investigation and Early Failure Hypotheses

The Dominion of Canada – then part of the British Empire – quickly authorized a geological investigation of the Frank Slide. Government geologists R.G. McConnell and R.W. Brock swiftly headed to Crowsnest Pass, completed a meticulous observational study of the region, and interviewed eyewitnesses. Their report, presented to provincial authorities in June 1903, is a concise, lucid account of the disaster. Initial reports of the slide had speculated that a volcanic eruption, earthquake, or mine explosion might have been at play, but the geologists readily concluded that these theories were, "it is almost unnecessary to say, without foundation." They reported that the fall of Turtle Mountain was a rockfall or block flow caused by toppling failures along joints within the Livingstone Formation limestone orthogonal to its bedding planes. McConnell and Brock also prudently recommended that serious consideration be given to relocating the town to avoid similar future disasters (McConnell and Brock 1904).

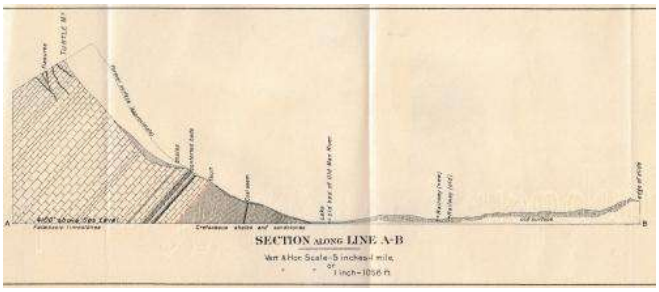

Image 17: Geologic cross-section of Turtle Mountain as initially drawn after the Frank Slide, with a dashed line indicating the pre-slide profile. This cross-section was later corrected into the one shown in Image 6.
Source: McConnell and Brock (1904).

For many years, McConnell and Brock's account of the Frank Slide's mechanism was largely accepted. Prominent texts repeated their findings, as did Karl Terzaghi, the founder of modern geotechnical engineering, when he described the slide as a progressive failure brought about by coal mining. Meanwhile, the mine reopened and Frank returned to and even exceeded its pre-slide prosperity, reaching a population of 1,000 by 1910. Yet the question remained of whether Turtle Mountain would pose further problems. R.W. Brock returned to Crowsnest Pass to assess this danger in 1909 and 1910. He concluded based on crevasses he observed that the mountain's North Peak still posed a risk of toppling. His stark assessment, along with a 1911 follow-up study, ultimately led to the Frank mine's closure early in 1912; its namesake and founder, H.L. Frank, had passed away a few years earlier. Simultaneously, the entire town was relocated 2 miles northwest, out of the hypothesized rockfall zone. It became part of the neighboring village of Blairmore (Alberta 2025, Anderson 1986, Cruden and Krahn 1978, McConnell and Brock 1904, Sharpe 1938, Terzaghi 1950).

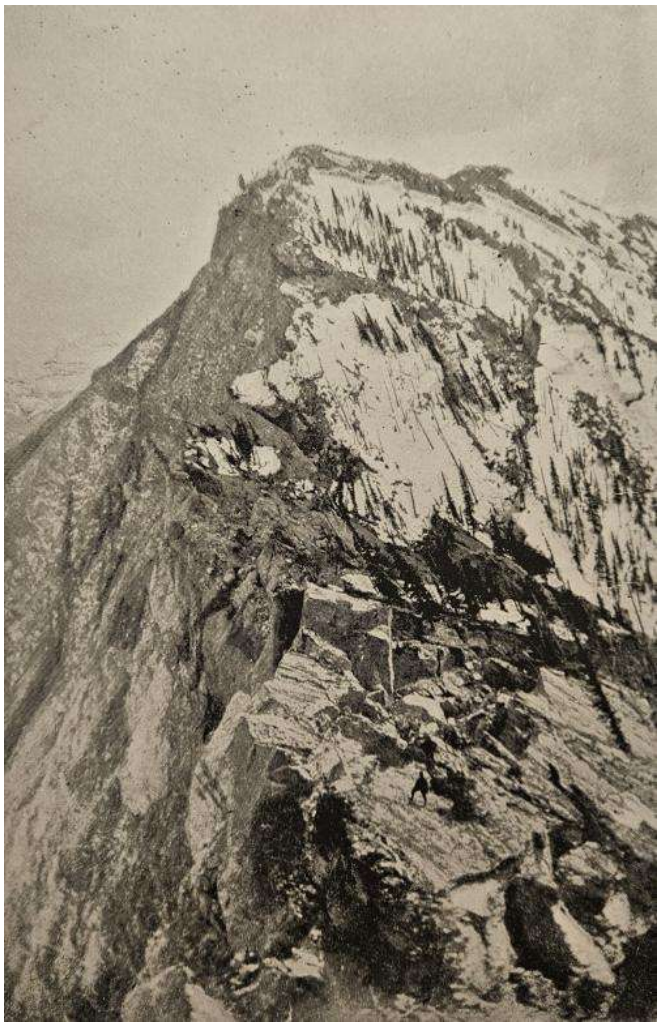

Image 18: Crevasses along the western side of Turtle Mountain's crest, 1903.
Source: McConnell and Brock (1904).

Further Research and Revised Failure Hypotheses

McConnell and Brock's organized, scientifically rigorous report on the Frank Slide remains an invaluable read. It met the contemporary standard of care and incorporated the best information available to its authors. Yet its shortcomings slowly became apparent as the study of geology was further developed over subsequent decades. In 1904, an economic geology survey party searching for coal in southwest Alberta first mapped the Turtle Mountain Anticline. Further regional geological studies from the 1930s to the 1950s established that the Frank Slide had been a rockslide avalanche along the Livingstone Formation limestone in the anticline's east limb. McConnell and Brock had mistakenly described the slide as a toppling failure across the formation's bedding planes because it had obliterated the anticline's axis and east limb at Turtle Mountain – a powerful example of survivor bias. The mid-century studies also found evidence of similarly sized paleo-landslides throughout the region, indicating that the disaster had not been a freak event. In the 1970s, geological engineering was first brought to bear in studying the Frank Slide by Professor David Cruden of the University of Alberta. He and his colleagues used direct shear tests to measure peak friction angle and cohesion values, ϕ' and c', of 28° and 32 psi (221 kPa) on the slide's slip surface and of 32° and 25 psi (172 kPa) on the Livingstone limestone joints. When they assessed the stability of Turtle Mountain's slopes using limit equilibrium analyses and these parameters, they obtained FS values below 1, showing just how precarious the mountain's equilibrium had been (Cruden and Krahn 1973, Cruden and Krahn 1978).

Image 19: Modern view of Crowsnest Pass looking northeast from above the crest of Turtle Mountain. Residences and businesses lie in the distance.
Source: Mei et al. (2008).

More recent research, including further work by Professor Cruden, has used numerical modeling to reexamine the Frank Slide. In the late 1990s, scholars reassessed the failure with finite difference and discrete element method techniques, representing mining activity within their models by gradually removing material at Turtle Mountain's base. FDM models generally agreed with the failure surface predicted by limit equilibrium analyses, but this agreement was weaker along the mountain's crest due to these models' inappropriate inherent assumption of material continuity in the highly jointed Livingstone Formation limestone. DEM models described the observed failure surface more accurately; in fact, these predicted the mountain's failure even before the Frank mine had reached its final pre-slide extent. Researchers have also revisited the slide using FEM models, which cannot incorporate rock discontinuities but are thus far less computationally expense than DEM models. The FEM models also provided results that reasonably agreed with the observed rockslide avalanche. Debate persists as to just how much coal mining at Turtle Mountain's base contributed to the slide. The FDM and DEM study cited it as a key factor, but the FEM study expressed more uncertainty about this, albeit without ruling it out (Benko and Stead 1998, Cruden and Martin 2007).

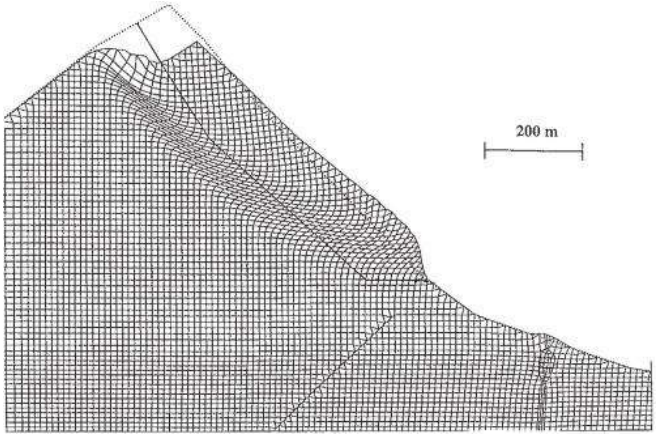

Image 20: FDM model of the Frank Slide.
Source: Benko and Stead (1998).

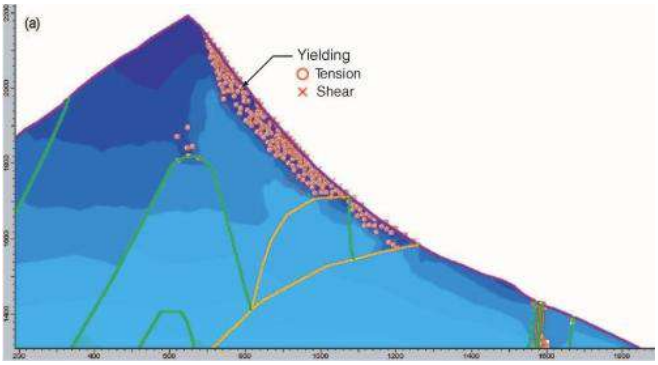

Image 21: FEM model of the Frank Slide.
Source: Cruden and Martin (2007).

Threat of Another Slide and Early Monitoring Efforts

As early as June 1903, R.G. McConnell and R.W. Brock wrote after their field survey that the specter of another rockslide on Turtle Mountain "must always overhang the town" of Frank. The mountain's North Peak was originally considered the most likely area for a future rockfall, as reflected in Frank's relocation, but this belief evolved as awareness of the Turtle Mountain anticline became more widespread. During the 1930s, geologists first became concerned by the possibility of a slide as large as 6.6 million cubic yards (5 million m3) from the mountain's South Peak. Accordingly, they installed the first manual gauges to assess the peak's stability to better forecast such an event. Some of these gauges were still in operation in the 1980s, when Professor David Cruden and his colleagues orchestrated the first systematic efforts for monitoring Turtle Mountain and its South Peak. Their main instrument of choice was the moiré gauge, marking its first use in North America. The 2-D version of the device uses overlaid grids to monitor gradual displacement, while 3-D moiré gauges allow rotation and temperature to be measured as well. Cruden and his peers supplemented these gauges using seismometers, photogrammetry, and electronic surveys. Collectively, this instrumentation indicated that Turtle Mountain was moving enough to warrant continued monitoring but not enough to suggest an imminent major issue. Unfortunately, a funding shortfall led the monitoring to be discontinued in the mid-1990s, right around the time the Frank Slide's final survivors passed away (Alberta 2025, Cruden and Krahn 1978, Froese et al. 2009, Froese and Moreno 2014, Kostak and Cruden 1990, McConnell and Brock 1904, Read et al. 2005).

Modern Monitoring of Turtle Mountain

While funding to monitor Turtle Mountain stopped, the mountain kept moving. By June 2001, when 16,500 tons (15,000

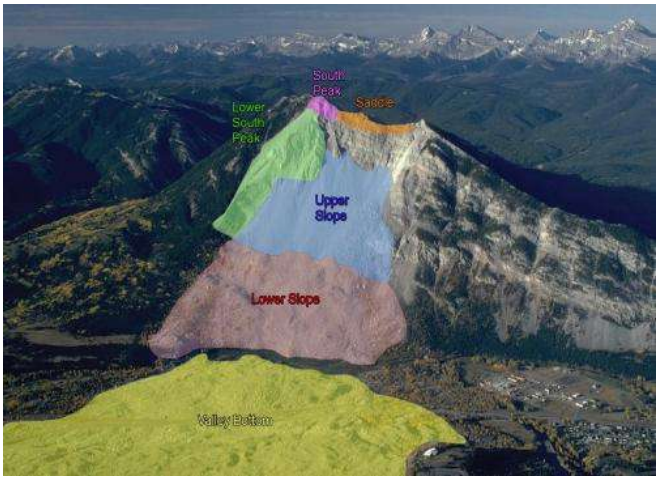

Image 22: Modern zones of monitoring on Turtle Mountain, looking west from Crowsnest Pass.
Source: Mei et al. (2008).

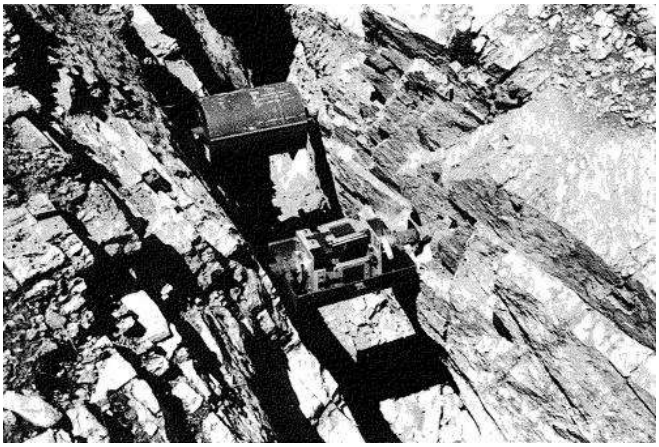

Image 23: Moiré gauge in a crack along Turtle Mountain's crest, 1980s.
Source: Kostak and Cruden (1990).

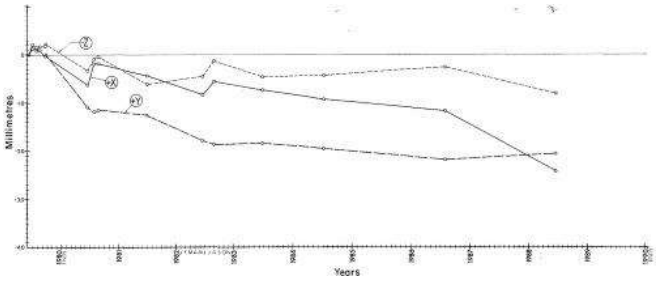

Image 24: Data readings from one of Turtle Mountain's moiré gauges.
Source: Kostak and Cruden (1990).

t) of rock fell from its North Peak, active sliding and rockfalls had destroyed about half the 1930s rock stability gauges. Accordingly, Alberta's provincial government marked the Frank Slide's centennial in April 2003 by pledging CAD $1.1M ($2.7M in 2025 USD) to a state-of-the-art, multidisciplinary monitoring program for Turtle Mountain. Researchers first replaced seismic stations along the mountain, installed a weather station there, and constructed a monitoring control center at the Frank Slide Interpretive Centre, a visitors center opened just across the Crowsnest River in the mid-1980s. Next, they installed crack gauges, electronic/laser surveys, and GPS monitoring to assess deformation and breakage within fissures in Turtle Mountain's South Peak. Finally, the team set up borehole instrumentation to keep tabs on displacement, temperature, pore pressures, and microseismic-

ity within the mountain, along with systems to monitor springs at its toe (particularly from the former Frank mine). Incredibly, the researchers completed this set-up work within two years and supplemented their efforts by surveying Turtle Mountain with satellite-based InSAR from April 2004 to October 2006 (Froese et al. 2009, Mei et al. 2008, Read et al. 2005).

Image 25: Installation of geophones on Turtle Mountain's South Peak using a helicopter-lifted drill rig.
Source: Read et al. (2005).

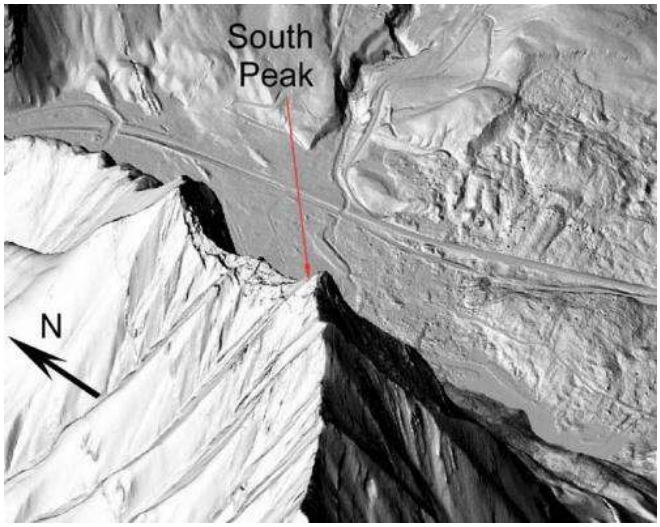

Image 26: InSAR scan of Turtle Mountain looking east, with 2x vertical exaggeration.
Source: Mei et al. (2008).

Initial results from the Turtle Mountain monitoring system demonstrated that it had been money well spent. The thick talus deposits on the mountain's slopes made some measurements tough to interpret, but the data clearly showed that portions of the South Peak had moved as much as 3.5 inches (88 mm) between 1982 and 2005. The instrumentation also confirmed the presence of four major non-bedding joint sets within the South Peak. Given these findings, the Turtle Mountain monitoring system has been consistently funded over the past 20 years. It currently includes 22 crack gauges, 20 survey prisms, 12 GPS receivers, 10 tiltmeters, 5 extensometers, several web cameras, a weather station, and an outflow weir at the mountain's base. Data from all these systems is wirelessly transmitted both to a nearby provincial office and to the control center at the Frank Slide Interpretive Centre, where it is reviewed daily and backed up weekly. Alarms are automatically tripped if readings exceed certain thresholds. A four-level alert system with prescribed protocols at each level ensures that emergencies are handled in as calm and orderly a manner as possible. Annual drills keep the warning system and those monitoring it prepared for worst-case scenarios, and the systems are checked every spring for snow damage (Froese and Moreno 2014, Froese et al. 2009, Mei et al. 2008, Read et al. 2005).

Image 27: Crevasse on Turtle Mountain's South Peak, with a researcher for scale.
Source: Read et al. (2005).

Image 28: Crevasses along the "saddle" of Turtle Mountain between the North and South Peaks.
Source: Mei et al. (2008).

So far, the news from researchers using the monitoring system to evaluate likely future rockslide activity at Turtle Mountain has been better than expected. To be sure, the mountain continues to move; "on an annual basis," one report noted, "localized blocks or series of blocks are observed to topple and fall." That said, the data indicates that the long-dreaded slide at South Peak is likely, when it happens, to be smaller than originally estimated. This would be especially fortuitous given that the South Peak slide's runout area was never adequately defined, and hundreds of residents now live in its shadow. Researchers also continue to keep an eye on seismicity induced beneath Turtle Mountain by the gradual collapse of the Frank mine's long-abandoned workings (Froese and Moreno 2014, Mei et al. 2008, Read et al. 2005).

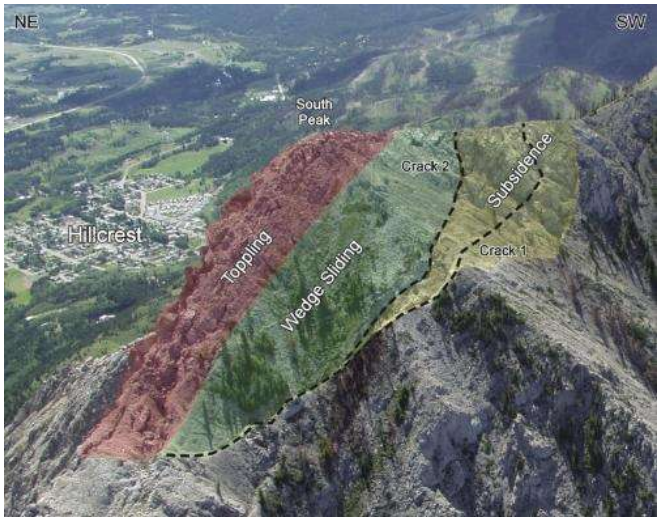

Image 29: Deformation zones of the South Peak of Turtle Mountain.
Source: Froese et al. (2009).

Conclusion: The Turtle Mountain Area Today

Frank, Alberta is now a ghost town but, ironically, is surrounded by life and livelihood. Every day, many tourists visit both the former hamlet and the nearby Frank Slide Interpretive Centre, where they can get both an overview of the disaster and a breathtaking view of the Turtle Mountain scarp and the immense debris field. Meanwhile, the area formerly comprising both Frank and the neighboring town of Blairmore is now the municipality of Crowsnest Pass, population 6,000. The mountain is visible from just about every corner of town, and the locals know its history all too well. So do the researchers and scientists who use the Turtle Mountain monitoring system to keep a close watch on the peak and prevent an ugly reprise of the tragedy of April 29th, 1903. They are ever on watch for the day when the turtle may reawaken, raising its head once more and bringing another barrage of limestone thundering down the mountain (Alberta 2025, GOA 2025).

Image 30: Current panorama of Turtle Mountain.
Source: Leckie (2021).

Acknowledgments

Sebastian Lobo-Guerrero, Ph.D., P.E., BC.GE, F.ASCE (A.G.E.S., Inc.: Canonsburg, PA), the author's former colleague, reviewed the entry's geotechnical content. Joe Krupansky, P.G. (GFT: Audubon, PA) reviewed the entry's geological content and provided the opportunity to write this entry as an article for the Association of Geo-Hazard Professionals. Dale Leckie, Ph.D. (Geologist: Calgary, AB), explained the Frank Slide's geologic fundamentals to the author. Prof. Emeritus David Cruden (University of Alberta: Edmonton, AB), a long-time scholar and frequent author on the Frank Slide, helped the author find several valuable resources on the disaster.

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Geotechnical "Facial Recognition" Challenge

Kok-Kwang Phoon, Yongmin Cai, and Chong Tang

Abstract

The site recognition challenge is to *quantify* site uniqueness, directly or indirectly, so that sparse site-specific data can be supplemented by big indirect data (BID) to produce a *quasi-site-specific* model. Engineers appreciate that every site is unique to some extent, but they do not have the ability to quantify this uniqueness. In all likelihood, the difference between two sites depends on the feature of interest (stratification, spatial variability, properties, anomaly, etc.). All sites in a region share common general features as a result of their geologic origin, but they are different at a detailed level when investigated using site investigation tools. This is broadly similar to the facial recognition challenge. However, the training set for facial recognition (photographs) is much bigger and more complete than the available training set for the site recognition challenge. In fact, there is no 3D photograph of a ground volume for any feature of engineering interest. Nonetheless, for the case of soil properties, this paper shows that it is possible to construct a quasi-site-specific (or quasilocal) transformation model from site specific small data and big indirect data. The strategies include the hierarchical Bayesian method, tailored clustering method, outlier detection, dimension reduction, and dictionary learning. These Bayesian machine learning methods can be combined to produce inferences that are more accurate and less biased than those from the classical probabilistic multiple regression (PMR) method. The computational cost of PMR is the lowest, but its disadvantages are significant. One example is that PMR cannot handle multivariate, uncertain and unique, sparse, incomplete, and potentially corrupted (MUSIC) which is a common set of data attributes for real site data. This paper reviews the state-of-the-art research in the site recognition challenge in the presence of MUSIC. Spatial variability and geologic uncertainty are not included in this review. The performance of each method is illustrated using an actual soil database. The comparison between methods using the same database is conducted for the first time in this paper.

Publication: ASCE-ASME Journal of Risk and Uncertainty in Engineering Systems, Part A: Civil Engineering, Volume 11, Issue 3, https://doi.org/10.1061/AJRUA6.RUENG-1553

How to excavate safely and ensure adjacent metro tunnels' stability

Leslie Connelly

The rise in urban population and increasing traffic congestion make metro systems a great way to navigate cities. However, expanding metro lines requires extensive underground development. These excavation projects frequently occur in close proximity to existing metro infrastructure, including stations and tunnels. Excavations are often conducted at zero distance on both sides of metro structures, which can significantly alter soil stress conditions, resulting in ground movement and structural deformation. Soft soil regions, such as the one in which Tianjin, China, is located, pose a particular risk, where excavation-induced heave can impact tunnel integrity and operational safety. Although there have been numerous studies on tunnel and station deformation due to adjacent excavation, most have focused on single-sided or isolated metro structures. The lack of research on asymmetrical bilateral zero-distance excavations leaves a critical gap in understanding the complex deformation behaviors and control strategies required for such scenarios.

A new paper, "Deformation and Control of Metro Structures during Asymmetric Bilateral Zero-Distance Excavations," addresses this gap by investigating the deformation mechanisms of a metro station and tunnels in Tianjin subjected to asymmetrical bilateral zero-distance excavations. Researchers Jie Zhen, Gang Zheng, Junhua Huang, Senbin Lin, Hongbin Pei, Shen Gao, Qinghan Li, and Xuesong Cheng use field measurements and numerical simulations to analyze horizontal and vertical displacements, track torsion, and determine the effectiveness of various control measures. Their findings provide civil engineers with practical guidance for designing and managing underground construction projects that minimize risks to existing metro infrastructure. Learn more about how this research contributes to ensuring the safety, stability, and longevity of metro systems in the *International Journal of Geomechanics* at https://ascelibrary.org/doi/10.1061/IJGNAI.GMENG-10499.

Deformation and Control of Metro Structures during Asymmetric Bilateral Zero-Distance Excavations

Jie Zhen, Gang Zheng, Junhua Huang, Senbin Lin, Hongbin Pei, Shen Gao, Qinghan Li, Ph.D., and Xuesong Cheng

Abstract

With the continuous expansion of metro networks, zero-distance excavations on both sides of metro lines in urban underground spaces have become increasingly common. However, limited research has been conducted on the deformation response and corresponding control measures for such excavations. Based on extensive field measurements, this study analyzed the deformation of an existing metro station and tunnels caused by large-scale zero-distance asymmetric excavations on both sides. The results show that excavations caused massive heave of the metro station and tunnels, which exceeded the original control value by approximately 50% and 100%, respectively. The metro station transmitted the heave significantly, extending the influence range of the excavation to more than 10 times the excavation depth (*H*), which is much larger than the common *2H–4H* excavation influence range; the tunnels exhibited lower transfer effects, and the influence range was *3H*. The metro station had good structural integrity, exhibiting horizontal displacement toward the deeper excavation, while the twin tunnels moved in opposite horizontal directions and toward their respective adjacent excavation sides. The tracks inclined toward the excavation on the north side and away from the excavation on the south side, causing slight torsion along the longitudinal direction. Furthermore, measures to control metro station heave were examined, and the results indicated that surcharge loading was effective. The control effects of different loading schemes were further studied by numerical simulations. For the same total loading strength, compared to single-stage loading, multistage loading during excavation has better control effects when the heave is extremely large at greater excavation depth. The special influence characteristics of asymmetric bilateral excavations at zero distance on the metro structures and control methods discussed in this study can provide useful reference information and guidance in the future for more rapid development and utilization of underground space.

Learn more and get details on how to apply these findings to make your similar underground situation safer in the ASCE Library: https://ascelibrary.org/doi/10.1061/IJGNAI.GMENG-10499.

Link between Cascadia and San Andreas Fault earthquakes discovered 30 years after lost vessel stumbled across key data

Geological records hint that earthquakes at the Cascadia subduction zone might trigger the San Andreas Fault.

Earthquakes at the San Andreas Fault may be triggered by activity at the Cascadia subduction zone, new research suggests. (Image credit: Cavan Images / Peter Essick via Getty Images)

A "Big One" on the Cascadia subduction zone in the Pacific Northwest might trigger a similarly serious earthquake on California's San Andreas Fault, new research suggests.

The findings are based on sediments taken from the seabed off the coast of Cape Mendocino, California and offshore Oregon. It's at Cape Mendocino that California's famous San Andreas fault ends and the Cascadia subduction zone begins.

These are two very different fault systems, but the sediment record suggests that in the past, at least three San Andreas earthquakes have happened within hours to a couple of days after large Cascadia quakes. Another seven or so may have occurred within decades to years or less. There are uncertainties in the dating and records, however.

But if the two fault systems are, in fact, synchronized, it could be a real problem for disaster relief, said study first author Chris Goldfinger, a paleoseismologist and professor emeritus at Oregon State University.

"Having these things side by side would really be a tough one," Goldfinger told Live Science. "There'd be not enough resources to respond to even one of these very well, and two of them would be really difficult."

Earthquake potential

Cascadia can create extremely powerful earthquakes. Famously, in 1700, the region experienced a quake thought to be between magnitude 8.7 and 9.2 that sent destructive tsunami waves all the way to Japan. These quakes are caused by movement of three oceanic plates (the Explorer, the Juan de Fuca, and the Gorda) slipping beneath the North American continent.

The San Andreas Fault, on the other hand, is a strike-slip fault where rock masses on either side of the fault move past each other horizontally. The largest known quake on the northern San Andreas was the 1906 San Francisco earthquake of approximately magnitude 7.9. Because the fault runs through densely populated areas, it could do a great deal of damage, as in the 1989 Loma Prieta earthquake that killed 63 people.

The two fault systems meet off the coast of Mendocino in an area known as the "triple junction." Goldfinger and his colleagues were on a research cruise in 1999 drilling core samples from the ocean floor in Cascadia, looking for signs of ancient earthquakes. When large earthquakes happen on land, they can trigger underwater flows of sand and sediment known as turbidites. Turbidites follow a pattern where coarse sediment settles out of the water first, creating a layer. Finer sands and silt follow, forming another layer.

On that cruise, however, a mix-up led to the ship traveling 60 miles from where they'd meant to be. The scientists, who were trying to nap between working, didn't realize the error until the ship arrived.

"I was just like, 'Oh no, we're like halfway to San Francisco,'" Goldfinger remembers.

He decided to take a core sample in that spot anyway. When the team later analyzed the sample, they realized it contained a mystery. The turbidites in the sample didn't have the coarse layer on the bottom and the finer layer on top, as was typical.

"This original core of the San Andreas had deposits that looked like they were upside-down," Goldfinger said. "The sand was at the top."

Upside-down evidence

The researchers had no explanation for this flip-flopped pattern. Nor, at first, did they have an explanation for another strange mystery of these offshore samples: Cores taken south of the triple junction, in the realm of the northern San Andreas, seemed to show earthquakes that matched eerily well to the timing of earthquakes taken north of the triple junction in Cascadia. In the last 1,300 years, they found, there were 18 likely earthquake-generated turbidites in Cascadia and 19 offshore from the northern San Andreas. Ten of those appeared to be deposited within 50 to 100 years of each other.

Core samples indicate that at least three earthquakes at the Cascadia subduction zone were followed by events at the San Andreas Fault within just hours or days. (Image credit: Chris Goldfinger)

Even weirder, in three cases, the coarse sand of the upper layer of these flip-flopped turbidites was mixed into the finer sand of the lower layer, suggesting the upper layer had settled while the bottom layer was still in motion. That would mean that the two layers were deposited within hours to days of one another. These three events included the 1700 Cascadia quake, as well as quakes 1,200 years ago and 1,500 years ago.

It took many years to conduct additional radiocarbon dating, gather corresponding earthquake records from other sources like lakebeds in California and ponder the meaning of these bizarre "doublet" turbidites. But ultimately, Goldfiner said, he came to realize that these San Andreas turbidites might rep--resent two different quakes: One, from the far-off Cascadia region, which shook off only lighter silt and sand, and the second, from a soon-after San Andreas quake that was locally stronger and could move coarser material.

"That would explain it," Goldfinger said. "It would explain the match-up of ages… that's what broke the dam."

The researchers argue in their new paper, published Sept. 29 in the journal Geosphere, that large quakes in Cascadia can transfer stress to the neighboring San Andreas, which then leads to a San Andreas earthquake not long after.

Earthquakes triggering one another are not unheard of, said Harold Tobin, a seismologist at the University of Washington who was not involved in the research. But most of those examples occur in the same fault zone.

"There aren't really examples that I can think of where two different types of plate boundary faults are so tightly coupled as what's proposed in this paper," Tobin told Live Science. The work was carefully done, he said, but "for me, the jury is still out on whether there could be other explanations for the sediment deposits or not."

Cascadia and the northern San Andreas region are highly seismically active, and many other faults could trigger earthquakes, Tobin said. Sedimentary deposits are complicated to interpret, and there are uncertainties inherent in radiocarbon dating.

"There are an awful lot of reasons why this is a complicated system," Tobin said. "This is an intriguing set of observations, but it's going to take even more detailed work to corroborate."

Goldfinger said he hoped the work would inspire Cascadia geologists and San Andreas geologists to work more closely together to do that detailed work.

"We all have a lot to learn from each other," he said. "I'm hoping it will ratchet up the quality of science on both sides."

(Stephanie Pappas / LIVESCKENCE, 13 Oct. 2025, https://www.livescience.com/planet-earth/earthquakes/link-between-cascadia-and-san-andreas-fault-earthquakes-discovered-30-years-after-lost-vessel-stumbled-across-key-data)

Unravelling the dance of earthquakes: Evidence of partial synchronization of the northern San Andreas fault and Cascadia megathrust

C. Goldfinger, J. Beeson, B. Black, A. Vizcaino, C.H. Nelson, A. Morey, J.R. Patton, J. Gutiérrez-Pastor, C. Romsos, and M.D. Walzcak

ABSTRACT

Previous paleoseismic work has suggested a possible stress triggering relationship between the Cascadia subduction zone and the northern San Andreas fault based on similar event timings. Turbidite successions correlated to both systems may support this hypothesis. Historic earthquakes in 1980 and 1992 in the Cascadia subduction zone and the 1906 earthquake on the northern San Andreas fault left turbidite records that are temporally well constrained by bomb-carbon– supported age- depth models. The 1906 event bed clearly appears on both sides of the triple junction, as may the 1992 bed. This demonstrates that northern San Andreas fault events have triggered turbidity currents in the southernmost Cascadia subduction zone, and vice versa. Turbidite successions in the southernmost Cascadia subduction zone and the Northern San Andreas fault prior to 1906 have similarities in timing and stratigraphy. During the past ~3100 yr, 18 likely earthquake- generated turbidite beds have been deposited in the southern Cascadia subduction zone. In Noyo Channel, along the northern San Andreas fault, 19 likely earthquake- generated beds were deposited during the same period. Ten of the Cascadia subduction zone beds have a close temporal association with the likely earthquake-generated beds in Noyo Channel. The radiocarbon age medians differ by an average of 63 yr (standard deviation = 51 yr). Eight of 10 of the beds with substantial temporal overlap with major Cascadia subduction zone events have a distinctive thick, inverted doublet stratigraphy in Noyo Channel along the northern San Andreas fault, while beds without timing similarities, including the 1906 earthquake bed, do not. These unusually thick doublets have a lower silty unit directly overlain by a robust sandy unit, commonly with an intervening erosional unconformity. Doublets are also observed in the southern Cascadia subduction zone, though less commonly. The Cascadia subduction zone doublets have a less robust upper unit, and some have the upper unit embedded in the tail of the lower unit. The doublet stratigraphy in Noyo Channel commonly fades southward along the northern San Andreas fault, while that on the Cascadia subduction zone side fades northward. The recurrence rate of major events near the triple junction is not the additive rate of both faults but is similar to the rate for either fault alone, implying the doublet beds represent pairs of beds from each fault, stacked together. We infer that the stratigraphy is best explained by earthquakes on both systems spaced closely in time, beginning with the Cascadia subduction zone, as opposed to aftershock sequences, hydrodynamic generation, or other causes. The Holocene sequence of closely stacked stratigraphic pairs may represent direct evidence of stress triggering and partial synchronization of these two great faults for the latest Holocene, with the possibility of significant interaction at earlier times.

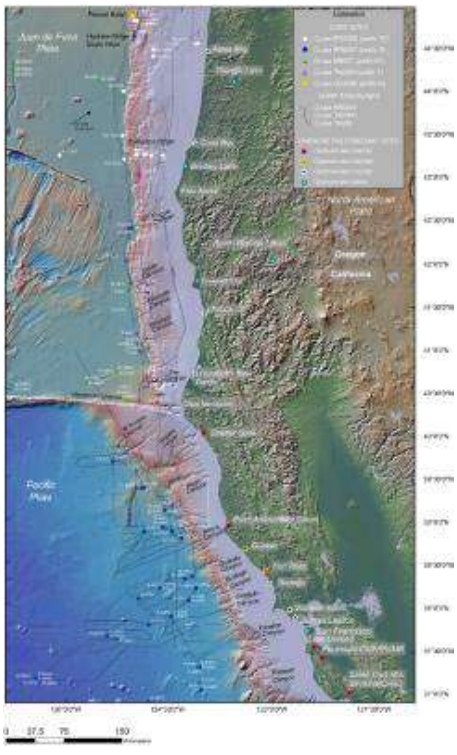


Figure 1. Regional map showing compiled bathymetry, core sites, and subbottom track lines for the southern Cascadia subduction zone and northern California margins. JDF—Juan de Fuca; NAM—North America; CS—Crystal Springs and Crystal Springs South; F—Filoli; PV—Portola Valley; MB—Monte Bello (Seitz, 2018); GF—Grizzly Flat; AF—Arano Flat; MC—Mill Canyon; HD—Hazel Dell.

(GeoScienceWord / Geosphere, September 29, 2025, https://pubs.geoscienceworld.org/gsa/geosphere/article/doi/10.1130/GES02857.1/661517/Unravelling-the-dance-of-earthquakes-Evidence-of)

Ionosphere revealed signals two hours before the 2021 Peru earthquake

Reet Kaur

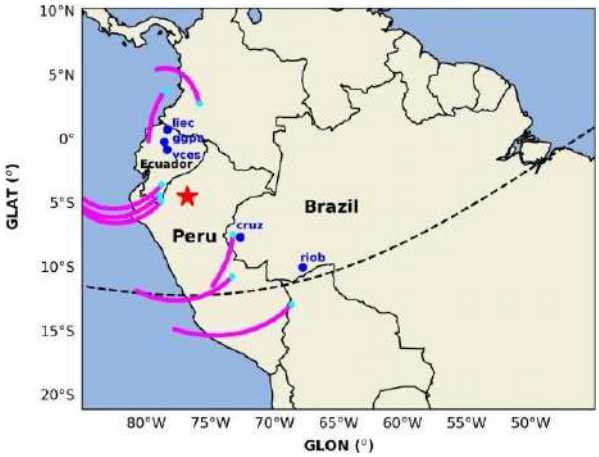
Ionospheric disturbances were observed up to two hours before the Mw 7.5 earthquake that struck northern Peru at 10:52 UTC (05:52 LT) on November 28, 2021, according to a new study published in the Journal of Atmospheric and Solar-Terrestrial Physics on September 27, 2025.

Collapsed houses in Utcubamba Province. Credit: Ministry of Defence (Peru)

The Mw 7.5 earthquake in northern Peru ruptured deep inside the subducted Nazca plate, 126 km (78 miles) beneath the surface. Well before the mainshock, anomalies in the ionosphere were already visible.

Using Global Navigation Satellite System (GNSS) data, researchers detected Total Electron Content (TEC) disturbances between 20 and 120 minutes before the event. These anomalies did not appear on the previous day, suggesting a direct link to seismic processes.

The anomalies became progressively stronger as the mainshock approached. This sequential increase in amplitude points to a possible buildup of tectonic stress mirrored in the ionosphere. For comparison, earlier studies usually reported anomalies only 30 to 40 minutes before major quakes, making this case unusual.



Locations of GNSS receivers are marked by blue dots. Magenta lines represent the IPP trajectories for GPS satellites 2, 5, 15, and 24, while cyan diamonds indicate the IPP at the time of the earthquake (10:52:14 UT). The red star marks the epicenter of the earthquake. The dashed curve, extending from west to east, represents the geomagnetic equator. Credit: Pre-seismic ionospheric disturbances (PIDs) associated With 2021 Mw 7.5 Northern Peru earthquake: GNSS and ground uplift observations, Oluwasegun M. Adebayo et al.

Frequencies match acoustic and infrasonic waves

Spectral analysis showed that the disturbances had center frequencies between 3.63 mHz and 4.80 mHz. This range aligns with acoustic and infrasonic waves, low-frequency pressure oscillations that can travel from the ground into the ionosphere.

The disturbances propagated at speeds of about 0.60 km/s (0.37 mi/s), a value consistent with sound velocity in the thermosphere at altitudes above 150 km (93 miles). The close match suggests that foreshocks or subtle ground uplift could have produced waves strong enough to disturb the ionosphere.

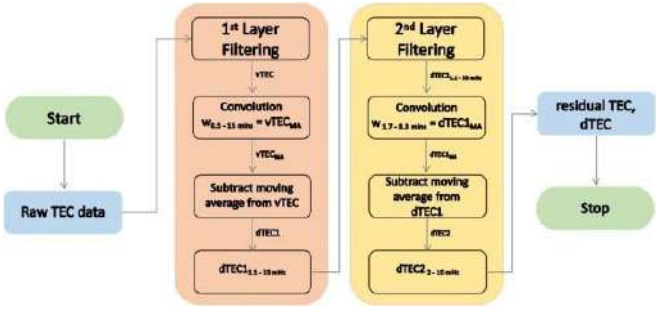
Although ground motion prior to the mainshock was very small, on the order of millimeters per second, these weak uplifts were sufficient once amplified in the rarefied upper atmosphere. Past research has shown that even slight surface motions can trigger detectable ionospheric compression or displacement.

Disturbances were strongest near the equator

The strength of the anomalies was not uniform across space. Receivers located close to the epicenter recorded strong signals, but trajectories extending toward the geomagnetic equator registered even higher amplitudes.

This equatorward amplification is a recurring pattern in seismo-ionospheric studies. It is thought to be driven by stronger ion-neutral coupling and the nearly horizontal magnetic field lines at low latitudes. Both effects make equatorial regions more sensitive to disturbances triggered by seismic activity.

Such regional differences mean that earthquake-related ionospheric signals may be easier to detect in some locations than others. The Peru case reinforces that geographic and geomagnetic context are critical for interpreting these anomalies.



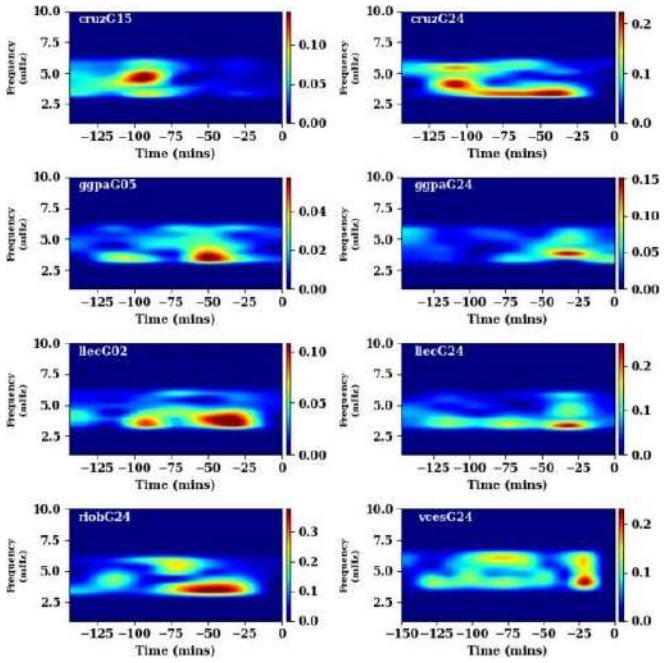
Flowchart of the data analysis process used to derive dTEC. Credit: Pre-seismic ionospheric disturbances (PIDs) associated With 2021 Mw 7.5 Northern Peru earthquake: GNSS and ground uplift observations, Oluwasegun M. Adebayo et al.

What drives these ionospheric changes

The study points to acoustic and infrasonic waves as the primary drivers. The roughly nine-minute delay between foreshock ground uplift and ionospheric anomalies matches the expected travel time for waves moving vertically from the ground to ionospheric heights.

Other processes could also play a role. Seismo-generated electric fields may arise from stress in the crust, modifying atmospheric conductivity and producing plasma drifts that affect ionospheric density. These electric field effects may be especially strong at low latitudes.

The Peru results show that several mechanisms could be working together. Acoustic waves appear dominant in this case, but ionospheric anomalies may emerge from multiple coupling pathways between the lithosphere, atmosphere, and ionosphere.



Spectral analysis on the dTEC data using Short-Time Fourier Transform (STFT). The color intensity indicates the spectral intensity. Red indicates greater energy levels and blue low energy levels. Credit: Pre-seismic ionospheric disturbances (PIDs) associated With 2021 Mw 7.5 Northern Peru earthquake: GNSS and ground uplift observations, Oluwasegun M. Adebayo et al.

Why this matters for earthquake science

Conventional earthquake early warning systems usually give seconds to minutes of lead time, limited by seismic wave travel. If ionospheric disturbances can be reliably linked to earthquakes, they could extend the warning window by tens of minutes or even hours.

However, global studies do not show consistent anomalies before every major earthquake. Some quakes with foreshocks appear to produce clear ionospheric signals, while others do not. This suggests that conditions such as depth, tectonic setting, and geomagnetic environment may determine whether PIDs appear.

Historical cases like the 1999 Chi-Chi earthquake in Taiwan, the 2008 Wenchuan earthquake in China, and the 2015 Nepal earthquake all showed ionospheric changes before the mainshock. But timing, amplitude, and frequency varied, making it difficult to build a universal forecasting model.

The 2021 Peru case provides one of the clearest examples yet that ionospheric monitoring could aid earthquake science. Still, much broader testing across different regions and tectonic environments is needed before the method can be used for reliable public warning.

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[1] Pre-seismic ionospheric disturbances (PIDs) associated With 2021 Mw 7.5 Northern Peru earthquake: GNSS and ground uplift observations – Oluwasegun M. Adebayo et al. – Journal of Atmospheric and Solar-Terrestrial Physics – September 27, 2025 – https://doi.org/10.1016/j.jastp.2025.106644 – OPEN ACCESS

(Reet Kaur / THE WATCHERS, October 5, 2025, https://watchers.news/epicenter/ionosphere-revealed-signals-two-hours-before-the-2021-peru-earthquake)

Coral skeletons reveal medieval tsunami and long-term seismic threat to the Caribbean

A newly dated medieval tsunami between 1381 and 1391 CE struck Anegada, the northernmost of the British Virgin Islands, when an M8.0 or greater earthquake ruptured the Puerto Rico Trench, according to an open-access study published in Geophysical Research Letters on October 8, 2025.

The tiny figures in this drone photo are standing near one of the stranded coral boulders, showing how far inland the tsunami carried it. Credit: Michaela Spiske

In the late 14th century, an M8.0 or greater earthquake shook the northeastern Caribbean and launched a tsunami toward the low island of Anegada.

Floodwaters swept coral and limestone debris across the island, scattering massive coral boulders hundreds of meters inland. Some of these still rest where the waves left them more than 600 years ago.

Researchers have now dated the event precisely between 1381 and 1391 CE, based on uranium-thorium analyses of coral skeletons. The study, published in Geophysical Research Letters on October 8, 2025, was led by Hali Kilbourne of the University of Maryland, with collaborators from the University of Washington, the US Geological Survey, and international research centers in France and Taiwan.

This tsunami remains the only known geological evidence of a great earthquake in the eastern Puerto Rico Trench. Its discovery fills a major gap in the Caribbean's seismic record, offering both historical perspective and modern warning.

The lead author explained that coral skeletons act like time capsules. They record the exact year they died, so by analyzing their chemistry, researchers can reconstruct the timeline of the disaster.

How coral skeletons recorded the wave

The researchers analyzed twenty coral samples collected on Anegada. Fourteen came from nine inland boulders believed to have been stranded by the tsunami, while six came from storm rubble at the shoreline.

Uranium-series dating relies on the decay of uranium absorbed by coral during its lifetime into thorium after death. By measuring the ratio of these isotopes, scientists can determine how long ago the coral stopped growing.

The most precise ages came from two core samples, 13AN5a and 13AN5b, drilled from a hemispherical coral colony of *Pseudodiploria strigosa* near Bones Bight. By counting annual growth bands between the inner sample and the coral's surface, the team determined the colony was killed by the tsunami between 1381 and 1391 CE.

"Corals have annual density bands much like tree rings," Kilbourne said. "We counted those bands and linked them to the uranium-thorium ages, giving us a year-by-year bracket"

The outermost growth bands suggested that the corals died during the warm season. The study concludes the tsunami likely struck between mid-summer and early autumn, when Caribbean waters were at their highest energy.

An earthquake between 1381 and 1391 triggered a tsunami in the northeastern Caribbean sea that stranded large coral boulders hundreds of meters inland on Anegada, the northernmost of the British Virgin Islands. A new University of Washington-led study dates the event based on analyses of the coral. Co-author Robert Halley is pictured beside a specimen. Credit: Brian Atwater/United States Geological Survey

An island uniquely exposed to tsunami energy

Anegada's location makes it far more vulnerable to tsunamis than most Caribbean islands. It lies directly south of the Puerto Rico Trench, where the Caribbean Plate slides beneath the North American Plate.

Unlike its neighbors, Anegada lacks a broad continental shelf. Its seabed drops steeply into deep ocean, meaning waves generated by a trench earthquake can race toward the island with little energy loss.

When the medieval quake ruptured, models suggest it produced an M8.0 or greater event, powerful enough to displace large coral boulders inland by several hundred meters. Those boulders remain silent witnesses to the wave's force.

Written records from the region go back only about five centuries, but no accounts mention such a tsunami. Geological deposits, however, allow scientists to look back thousands of years.

The 14th-century event demonstrates that even long-quiet subduction zones can produce major earthquakes and tsunamis, with recurrence intervals possibly spanning several thousand years.

Testing the evidence in the lab

To confirm the timing, the research team conducted laboratory tests at two leading isotope facilities. The core samples were analyzed at the High-Precision Mass Spectrometry and Environment Change Laboratory at National Taiwan University, and the hand samples were processed at CEREGE in France.

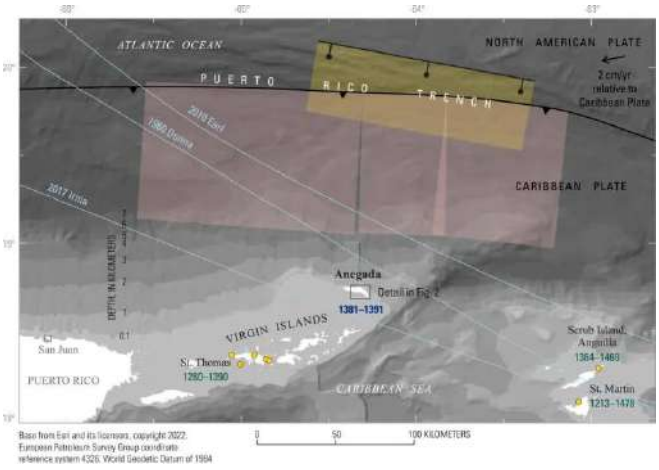
Each sample underwent multiple quality checks to ensure it had not been altered since burial. X-radiographs and X-ray

diffraction were used to detect calcite formation or dissolution, which can distort isotopic ratios.

All but one sample, known as AN11, passed these reliability tests. AN11 showed slight contamination and was excluded from the main analysis.

The team also compared uranium-thorium ages with 41 radiocarbon ages from other coral fragments. Using the Marine20 calibration curve and a local reservoir correction of ΔR = −216 ± 44 radiocarbon years, the results confirmed that most corals date to the same 14th-century event.

This combination of geochronology and cross-checking provided one of the most precise tsunami chronologies ever achieved in tropical geology.



This map shows Anegada relative to the Puerto Rico Trench, where the Caribbean and North American plates meet. It includes the path of three recent hurricanes to show why it was difficult for the researchers to determine what moved the coral. Credit: Atwater et al./Geophysical Research Letters

A wider Caribbean impact

The geological signature of the medieval tsunami extends beyond Anegada. Sediment layers of the same age appear on nearby islands, including St. Thomas, Anguilla, and St. Martin, more than 200 km (124 miles) away.

These layers contain sand, shell fragments, and coral debris deposited well inland, indicating a single large regional event rather than multiple local storms.

Numerical simulations reproduce similar flooding patterns when modeling an M8.0 or greater earthquake on the Puerto Rico Trench. The models suggest either extensional faulting within the descending North American Plate or thrust rupture at the boundary with the Caribbean Plate could have produced the wave.

Researchers estimate that earthquakes of this scale recur on timescales of several thousand years. That makes the medieval tsunami an extremely rare but still relevant event, a geological warning for coastal infrastructure planning today.

For comparison, hurricanes like Donna (1960), Earl (2010), and Irma (2017) produced strong winds and storm surges, yet left little permanent geological trace. Only a tsunami could have moved the massive coral boulders now found inland on Anegada.

Why it matters for modern hazard planning

The study's precise dating has major implications for regional safety and preparedness. It confirms that the Puerto Rico Trench is capable of producing great earthquakes and destructive tsunamis, even though none have been recorded in written Caribbean history.

"If you are building critical facilities near the coast, you must account for this level of seismic risk," said Atwater. "It is rare, but it is real."

Regional exercises such as Caribe Wave, organized by NOAA and UNESCO, now incorporate trench-based tsunami scenarios. In 2024, nearly 500 000 participants across the Caribbean practiced evacuation and communication procedures for such an event.

Having a well-dated example provides a real historical foundation for these simulations, helping local governments prepare for the kind of disaster that might otherwise seem unimaginable.

The tsunami of 1381–1391 CE stands as both a geological discovery and a warning written in coral, reminding the region that deep time can inform present-day safety.

Coral archives and climate connections

The coral skeletons also preserve environmental data. Their chemistry records seawater temperatures and salinity, allowing scientists to reconstruct ocean conditions during the late medieval period.

Kilbourne and her colleagues plan to continue studying these samples to compare 14th-century sea-surface temperatures with those of today.

Previous work by Yuan-yuan Xu and others has already shown that coral isotopes can trace sub-annual changes in ocean temperature. The Anegada samples may extend that record further, bridging the medieval climate with modern warming trends.

In this way, the same coral skeletons that reveal an ancient tsunami also record centuries of ocean change, linking the study of natural disasters to long-term climate science.

A message from the past

The Anegada tsunami shows that the Caribbean's apparent calm can be deceptive. Great earthquakes along the Puerto Rico Trench are rare but inevitable over geological time.

By analyzing the coral boulders with atomic precision, scientists have resurrected the story of one such event that occurred nearly 650 years ago.

The corals, stranded far from the sea that once nurtured them, now serve as a warning. They show that the region's most dangerous earthquakes may come not from what people remember, but from what the land remembers for them.

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[1] Coral skeletons left by a medieval tsunami whisper warning for Caribbean region – UW News – October 16, 2025

[2] Dating a Medieval Tsunami With Uranium-Series Techniques on Caribbean Corals – K. Halimeda Kilbourne et al. – Geophysical Research Letters – October 8, 2025 – https://doi.org/10.1029/2024GL114448

(Reet Kaur / THE WATCHERS, Friday, October 24, 2025, https://watchers.news/epicenter/coral-skeletons-reveal-medieval-tsunami-and-long-term-seismic-threat-to-the-caribbean/)

Easter Island statues may have 'walked' thanks to 'pendulum dynamics' and with as few as 15 people, study finds

Simple physics may explain how the Easter Island statues could "walk" miles with only a handful of people, but the de-bate over their transport is far from over.

Field experiments revealed that using rope and a small group of people, the people of Rapa Nui could have "walked" the moai statues. (Image credit: Carl Lipo)

Easter Island's giant moai statues could "walk" with only three things in place: a small group of people, long ropes and the use of pendulum dynamics, a new study finds.

Researchers have long debated how the Indigenous people of Easter Island, also known as Rapa Nui, moved their huge human-faced moai statues — which can weigh dozens of tons, on average — centuries ago. Now, a new study finds that physics was on their side.

Anthropologists made the discovery after realizing that incomplete moai statues that had been discarded shortly after being quarried were missing certain details. They noticed that before being carved into their final ceremonial design, the statues had been crafted to have a low center of mass and a forward lean to assist their transport, the team wrote in the study, which was published in the November 2025 issue of the Journal of Archaeological Science.

The team virtually recreated the moai and found that, with the help of three ropes and anywhere between five and 60 people, the moai could have taken steps averaging 35 inches (89 centimeters) long to travel across the Rapa Nui landscape.

Together, these findings provide "compelling" evidence against the traditional view that Rapa Nui communities needed vast amounts of resources and huge numbers of people to move the moai from the Rano Raraku quarry to their final position, the authors wrote.

"What we found is the fact that statues were moved with very small numbers of people in an amazingly ingenious way," study co-author Carl Lipo, a professor of anthropology at Binghamton University in New York, told Live Science. "In a way that when you see it happen you're like 'of course they moved it that way,'"

The "walking" moai experiment

Rapa Nui was first settled around 1,000 years ago. Today, the people of Rapa Nui share this 63-square-mile (164 square kilometers) island with at least 962 moai: Gigantic stone statues depicting heads and torsos ranging from 3.7 feet (1.1 meters) to 32.6 ft (9.8 m) tall. The ceremonial positions of the moai are an average of 6.2 miles (10 km) from where they were quarried.

The way the Rapa Nui people moved these megaliths centuries ago, however, has been hotly debated. One hypothesis is that the statues "walked," with Lipo and his team conducting a televised "experiment" in 2012 showing a team of 18 people "walking" a scaled 4.8 ton (4.4 metric ton) replica a distance of 328 feet (100 m) in 40 minutes.

"It wasn't an experiment in the sense of we weren't testing out specific ideas about numbers of people," Lipo said. "Our goal was simply: What's the least number of people we can get to move this thing."

He admitted that testing the physics to see how many people were needed to move the moai should have been done before the test run on the replica. To slot this missing piece into the puzzle, Lipo and study co-author Terry Hunt, a professor of anthropology at the University of Arizona, built virtual 3D models of the 62 moai found along centuries-old roads — dubbed "road moai."

This revealed that these statues had a distinctive forward lean of around 6 degrees to 15 degrees, shifting their center of mass in such a way that the moai would topple if they stood by themselves. In fact, the center of mass was consistently lower than the final moai statues, which the authors suggest provided the stability needed for the sideways rocking generated as part of the "walks."

Example of a road moai that fell and was abandoned after an attempt to re-erect it by excavating under its base, leaving it partially buried at an angle. (Image credit: Carl Lipo)

The road moai also have a D-shaped base, which acted as a "pivot point" for each step, the authors wrote. The lack of eye sockets in all road moai, but their presence in all final moai, evidences the fact that the finishing touches were carved when they arrived at their final destination, they added.

The team also modeled the physics of the "walking" moai to determine the workforce requirements and the travel time based on 65 feet to 98 feet (20 to 30 m) long ropes. This included incorporating the mass of the moai and their irregular shapes and calculating the force needed to get the "walking" motion started.

They found that, depending on the moai's gigantic size, 15 to 60 people were needed to start the movement and five to 25 to continue it, indicating that this mode of transport was "remarkably efficient," the authors wrote in the study.

Tugging on the ropes created a rocking motion, causing the base to pivot and "step" forward. Pendulum dynamics meant the steps became less effortful once initiated.

The researchers calculated that the moai could "walk," on average, 1,000 feet (310 m) per hour, with the larger moai not necessarily being slower because they had longer strides. An average-size moai would have taken around 11,000 steps for a 6.2 mile (10 km) journey.

An outside take

This research is "an ingenious and worthwhile contribution to the discussion," Sue Hamilton, an archaeologist and professor of prehistory at University College London who was not involved in the research, told Live Science in an email.

However, Hamilton said that "the data presented are consistent with a range of interpretations, not just those of the authors." For example, she said the road moai may have been engineered differently because they served a different ceremonial purpose, were made by different people with varying levels of expertise or were a trend from a particular point in time.

Hamilton also emphasized that this research shows one possibility of how the people of Rapa Nui moved the moai, but that there are other plausible hypotheses. "The current work by the authors further demonstrates the technical possibility of upright movement of the statues (moai), but it does not prove that it happened," Hamilton said.

For Lipo and Hunt, the critics of the walking moai hypothesis "have yet to offer plausible alternatives that account for the full range of evidence," they wrote in the study.

(Sophie Berdugo / LIVE SCIENCE, October 19, 2025, https://www.livescience.com/archaeology/easter-island-statues-may-have-walked-thanks-to-pendulum-dynamics-and-with-as-few-as-15-people-study-finds)

The walking *moai* hypothesis: Archaeological evidence, experimental validation, and response to critics

Carl P. Lipo, Terry L. Hunt

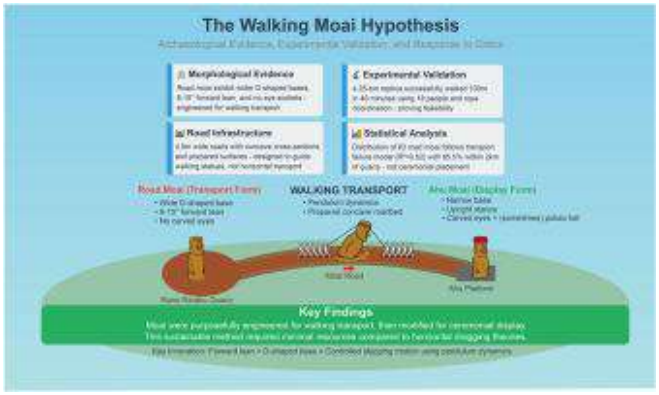
Highlights

- Road *moai* exhibit forward lean and D-shaped bases engineered for walking transport.
- 4.35-ton *moai* replica successfully walked 100m in 40 min using 18 people.
- Systematic critique of alternative models shows walking best explains evidence.
- Statistical analysis of 962 *moai* refutes ceremonial placement hypotheses.
- Walking method required minimal resources, challenging ecocide narratives.

Abstract

The transport of Rapa Nui's (Easter Island) monumental *moai* statues has been debated for over a century. Based on a systematic analysis of 962 *moai*, with a focus on 62 road statues, combined with 3D modeling and experimental trials, we demonstrate that these multi-ton megaliths were designed for transport vertically in a controlled "walking" motion facilitated by their carved shapes. Our evidence includes distinctive morphological features of road *moai* (wide, D-shaped bases and forward lean), archaeological road characteristics (4.5m wide, concave cross-sections), non-random breakage patterns, and successful experimental validation using a precisely-scaled 4.35 metric ton replica based on road *moai* morphology. Our experiments revealed that the forward-leaning design enabled efficient transport, covering 100 m in 40 min with a team of 18 people—a significant improvement over earlier vertical transport attempts that used incorrectly proportioned *ahu moai* forms. Statistical analysis of the road *moai* distribution reveals patterns that are strongly consistent with transport failure: 51.6 % concentrate within 2 km of the Rano Raraku quarry, following an exponential decay pattern expected from mechanical failure processes rather than deliberate ceremonial placement. Despite empirical support, several scholars have challenged the walking hypothesis. We systematically address critiques regarding terrain constraints, rope availability, weathering patterns, and alternative transport mechanisms, demonstrating how objections fail to account for the comprehensive archaeological evidence supporting vertical transport. The walking method required minimal resources and labor compared to horizontal transport hypotheses, revealing sophisticated engineering rather than environmental destruction, and aligning with Rapa Nui oral traditions that describe *moai* "walking" from the quarry.

Graphical abstract



(https://doi.org/10.1016/j.jas.2025.106383, https://www.sciencedirect.com/science/article/abs/pii/S0305440325002328)

Engineers Found Evidence of Hydraulics in an Ancient Pyramid, Solving a 4,500-Year-Old Mystery

See how Egyptian engineers might have used water to shape history's greatest monuments.

Anton Petrus//Getty Images

Hydraulic mechanics may have indeed been the driving force behind the construction of ancient Egyptian pyramids.

In a preprint paper, scientists concluded that the Step Pyramid of Djoser in Saqqara, Egypt—believed to be the oldest of the seven monumental pyramids and potentially constructed about 4,500 years ago—offers a remarkable blueprint for hydraulic engineering.

The hydraulic-powered mechanism could have maneuvered the oversized stone blocks forming the pyramid, starting from the ground up. The research team says the Step Pyramid's internal architecture is consistent with a hydraulic elevation mechanism, something that's never been reported before at that place or in that time.

By lifting the stones from the interior of the pyramid in what the authors call a "volcano fashion," the water pressure from the hydraulic system could have pushed the blocks into place. If proved out, this research shows the Egyptians had a powerful understanding of advanced hydraulic systems well before modern scholars believed they did. That begs the question: Was this the first major use of the system, or had it been in play previously?

No matter the answer, pulling it off at the Step Pyramid would have been no easy feat.

The team believes that based on the mapping of nearby watersheds, one of the massive—and yet unexplained—Saqqara structures, known as the Gisr el-Mudir enclosure, has the features of a check dam with the intent to trap sediment and water. The scientists say the topography beyond the dam suggests a possible temporary lake west of the Djoser complex, with water flow surrounding it in a moat-like design.

As a Nile tributary fed the area, a dam could have created a temporary lake, potentially linking the river to a "Dry Moat" around the Djoser site, helping move materials and serving the hydraulic needs.

"The ancient architects likely raised the stones from the pyramid center in a volcano fashion using the sediment-free water from the Dry Moat's south section," the authors write.

In one section of the moat, the team found that a monumental linear rock-cut structure consisting of successive, deep-trench compartments combines the technical requirement of a water treatment facility—and a design still often seen in modern-day water treatment plants—by including a settling basin, retention basin, and purification system.

"Together, the Gisr el-Mudir and the Dry Moat's inner south section work as a unified hydraulics system that improves water quality and regulates flow for practical purposes and human needs," the authors write. The team believes the water available in the area was sufficient to meet the needs of the project.

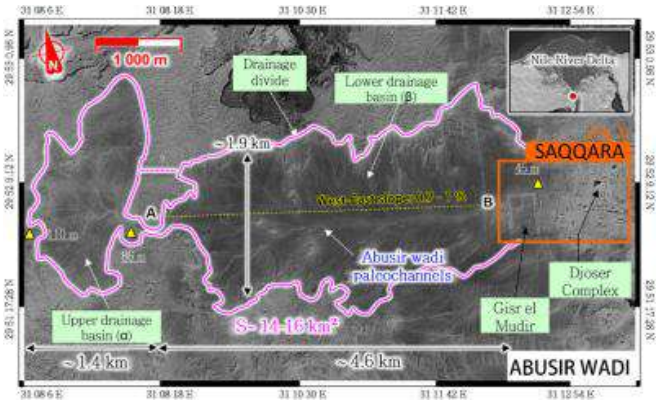
(Tim Newcomb / POPULAR MECHANICS, Oct 05, 2025, https://www.popularmechanics.com/science/archaeology/a68832523/ancient-egyptian-pyramid-hydraulic-system-discovery)

On the possible use of hydraulic force to assist with building the step pyramid of Saqqara

Xavier Landreau, Guillaume Piton, Guillaume Morin, Pascal Bartout

Abstract and Figures

The Step Pyramid of Djoser in Saqqara, Egypt, is considered the oldest of the seven monumental pyramids built about 4,500 years ago. From transdisciplinary analysis, it was discovered that a hydraulic lift may have been used to build the pyramid. Based on our mapping of the nearby watersheds, we show that one of the unexplained massive Saqqara structures, the Gisr el-Mudir enclosure, has the features of a check dam with the intent to trap sediment and water. The topography beyond the dam suggests a possible ephemeral lake west of the Djoser complex and water flow inside the 'Dry Moat' surrounding it. In the southern section of the moat, we show that the monumental linear rock-cut structure consisting of successive, deep compartments combines the technical requirements of a water treatment facility: a settling basin, a retention basin, and a purification system. Together, the



General location of the Djoser complex at Saqqara (inset) and drainage area of the Abusir wadi, west of the Gisr el-Mudir enclosure (Satellite image: Airbus Pléiades, 2021-07-02, reprinted from Airbus D&S SAS library under a CC BY license, with permission from Michael Chemouny, original copyright 2021).

Gisr el-Mudir and the Dry Moat's inner south section work as a unified hydraulic system that improves water quality and regulates flow for practical purposes and human needs. Finally, we identified that the Step Pyramid's internal architecture is consistent with a hydraulic elevation mechanism never reported before. The ancient architects may have raised the stones from the pyramid centre in a volcano fashion using the sediment-free water from the Dry Moat's south section. Ancient Egyptians are famous for their pioneering and mastery of hydraulics through canals for irrigation purposes and barges to transport huge stones. This work opens a new line

of research: the use of hydraulic force to erect the massive structures built by Pharaohs.

(Landreau, Xavier & Piton, Guillaume & Morin, Guillaume & Bartout, Pascal & Touchart, Laurent & Giraud, Christophe & Barre, Jean-Claude & Guerin, Cyrielle & Alibert, Alexis & Lallemand, Charly. (2024). On the possible use of hydraulic force to assist with building the step pyramid of Saqqara. PLOS ONE. 19. 10.1371/journal.pone.0306690, https://www.researchgate.net/publication/382523656_On_the_possible_use_of_hydraulic_force_to_assist_with_building_the_step_pyramid_of_saqqara)

Gisr el-Mudir in Giza, Egypt

The Gisr el-Mudir, a massive stone structure near the Pyramid of Djoser, has been reinterpreted by researchers as a large-scale stone dam. Spanning nearly 1,180 feet, it was designed to capture and store up to 14 million cubic feet of seasonal floodwaters from nearby wadis. The strategic placement and construction of the dam underscore its critical role in supporting the logistics of pyramid construction.

An interconnected network of dams, basins and shafts around the pyramid demonstrates how ancient Egyptians strategically captured and utilized seasonal floodwaters, providing essential water for building activities. The discovery highlights a level of hydraulic engineering and resource management previously underestimated in ancient Egypt.

Full Story: Sustainability Times (9/27)

Egyptian archaeological workers excavating the site of the Step Pyramid of Djoser in Saqqara during the announcement of new discoveries at the Director Bridge in Saqqara, on January 26, 2023 in Giza, Egypt. (Fadel Dawod/Getty Images)

(SmartBrief for Civil Engineers, October 3, 2025)

"They Found 14 Million Cubic Feet Underground": Egyptian Scientists Expose Hidden Water System That Built The Pyramids

In a groundbreaking discovery that challenges conventional historical narratives, archaeologists have uncovered evidence of advanced hydraulic engineering used by ancient Egyptians to construct the iconic pyramids, unveiling a previously unimagined level of technological sophistication in an era long considered primitive.

Illustration of the advanced hydraulic engineering system used by ancient Egyptians to construct the Pyramid of Djoser.

IN A NUTSHELL

- Researchers discovered a sophisticated **water management system** around the Pyramid of Djoser, revealing advanced construction techniques.
- The ancient structure at Saqqara, known as Gisr el-Mudir, is identified as a **stone dam** capturing seasonal floodwaters.
- A complex network beneath the pyramid suggests the use of a **hydraulic elevator system** to move massive stone blocks.
- The findings challenge traditional views, highlighting the **technical ingenuity** of ancient Egyptians.

In the arid expanses of the Egyptian desert, an extraordinary discovery is challenging our long-held perceptions of ancient engineering. Researchers have uncovered a sophisticated water management system surrounding the Pyramid of Djoser, suggesting that ancient Egyptians employed advanced construction techniques far beyond what was previously imagined. This revelation not only redefines our understanding of how these monumental structures were built but also highlights the technical ingenuity of the civilization that erected them. By examining this intricate network of hydraulic systems, scholars are gaining fresh insights into the resourcefulness and innovation of the ancient builders.

Ingenious Stone Dam Capturing Desert Floodwaters

Located in Saqqara, the mysterious structure known as Gisr el-Mudir has long puzzled archaeologists. Spanning nearly 1,180 feet, this stone enclosure is one of Egypt's oldest constructions. New research conducted by Xavier Landreau and his team from the CEA Paleotechnic Institute offers a groundbreaking perspective on its purpose. Contrary to previous theories that labeled it as a ritual or defensive structure, the research published in PLOS ONE suggests it served as a dam. This dam was designed to capture the seasonal floodwaters from nearby wadis, highlighting the strategic integration of environmental resources in ancient construction.

By examining terrain slopes, ancient watercourses, and erosion marks, researchers reconstructed a watershed system capable of channeling water into the enclosure, which acted as a temporary reservoir. The stone dam's capacity to hold up to 14 million cubic feet of water underscores its critical role in supporting large-scale construction projects. This capacity reflects the Egyptians' understanding of seasonal cycles and resource management. The discovery shifts the historical significance of Saqqara, suggesting that its location was strategically chosen for geological and hydrological benefits, rather than solely for religious or political reasons.

How Hydraulic Construction of Pyramids Worked

The presence of a substantial water reservoir was essential, but it alone could not elevate the massive limestone blocks required for pyramid construction. The secret to this feat lies within the depths of the Djoser complex itself. A vast trench carved into the rock beneath the pyramid, previously thought to be symbolic, reveals a series of interconnected basins and compartments. This network likely functioned as a water treatment system, where heavier sediments settled first, gradually clarifying the water.

This purified water was then used to power a vertical lifting system beneath the pyramid. Two vertical shafts, connected by a 656-foot-long underground gallery, enabled the use of a flotation device. By placing stone blocks on a floating platform, they could be elevated using the simple pressure of water injected into these shafts. As the load reached its desired height, it could be maneuvered onto the upper tiers of the monument. This system, akin to a hydraulic elevator, utilized water's force to significantly reduce the mechanical effort required for construction.

Sophisticated Technology Matching Pharaohs' Ambitions

While the notion of hydraulic construction may seem audacious, it is backed by concrete evidence on-site. The intricate organization of dams, basins, galleries, and shafts forms a coherent system that aligns with the principles of hydraulic engineering. The ancient Egyptians were not strangers to water-related technologies; their proficiency in irrigation canals, wooden gates, and agricultural dams attests to their hydraulic expertise.

This study reveals that such a system could diminish the need for extensive external ramps, reducing labor demands and logistical constraints. The construction project would thus gain efficiency, safety, and precision. This advanced level of engineering urges researchers to reevaluate other Old Kingdom monuments. The Pyramid of Djoser, often considered a prototype, may represent the pinnacle of a highly developed technology that subsequent dynasties found challenging to replicate. This finding challenges the conventional narrative of pyramid construction, suggesting a complex blend of engineering prowess and environmental adaptation.

How Saqqara's Hydraulic Remains Alter Our Historical Perspective

Until now, the study of pyramids has focused predominantly on their symbolic and architectural aspects. The discovery of an integrated hydraulic system presents new opportunities for exploration. It reveals that the builders were not merely executing a religious mandate but also crafting a sustainable technical ecosystem tailored to their environment and resources.

This multidisciplinary approach—encompassing archaeology, hydrology, and geotechnics—enriches our understanding of ancient Egypt. It uncovers a sophisticated work organization, meticulous material management, and a nuanced exploitation of the territory. The pyramids, as it turns out, were not solely the result of a massive labor force but also the product of an underestimated technical genius. This perspective invites us to reassess other monumental sites for similar hidden hydraulic systems, potentially rewriting our understanding of ancient innovation.

The revelations about ancient Egyptians' engineering prowess leave us with an intriguing question: What other technological wonders remain concealed beneath the sands, waiting to reshape our understanding of history once more?

This article is based on verified sources and supported by editorial technologies.

(Hina Dinoo / SUSTAINABILITY TIMES, 27 Sept. 2025, https://www.sustainability-times.com/research/they-found-14-million-cubic-feet-underground-egyptian-scientists-expose-hidden-water-system-that-built-the-pyramids)

Ancient Egyptian Engineers Used Advanced Hydraulic System to Build Pyramids

A groundbreaking study published in PLOS ONE has unveiled a remarkable discovery about the engineering behind the construction of ancient Egyptian pyramids. The research, led by Xavier Landreau from the CEA Paleotechnic Institute in France, suggests that the 4,500-year-old Pyramid of Djoser, also known as the Step Pyramid, was built using a sophisticated hydraulic lift system.

The interdisciplinary team of researchers conducted a comprehensive analysis of the Saqqara site, where the Pyramid of Djoser is located. They discovered that the nearby Gisr el-Mudir enclosure, a massive structure measuring 360m by 620m, likely functioned as a check dam designed to trap sediment and water. This finding is significant as it provides insights into the water management strategies employed by the ancient Egyptians.

Furthermore, the researchers identified a series of deep compartments in the "Dry Moat" southern section surrounding the Djoser complex. These compartments, connected by a rock-cut conduit, have served as a water treatment system consisting of a settling basin, a retention basin, and a purification system. The Gisr el-Mudir dam and the Dry Moat's inner south section formed a unified hydraulic system that improved water quality and regulated flow for practical purposes and human needs.

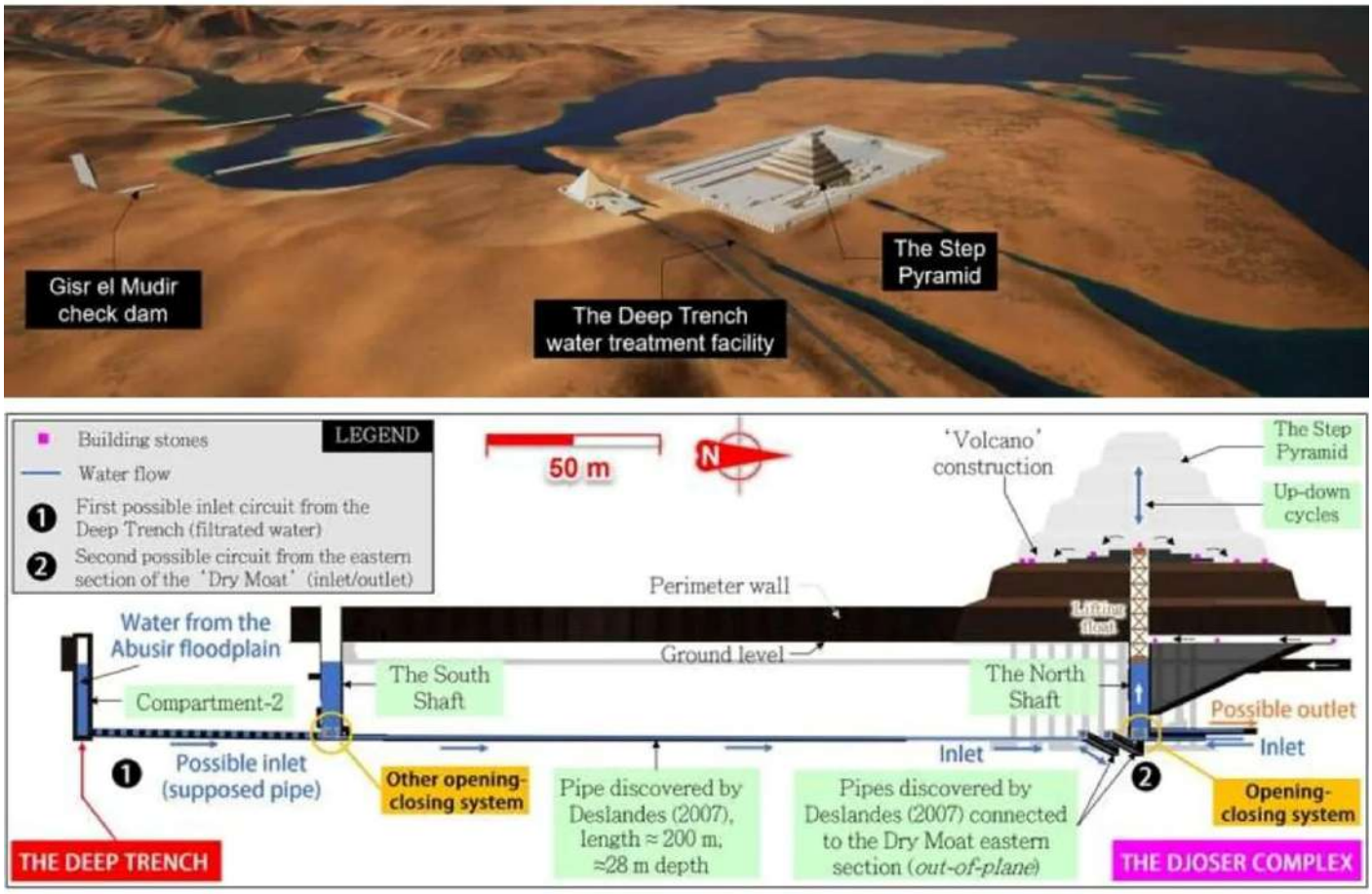
The most intriguing discovery, however, lies within the Step Pyramid itself. The researchers found that the pyramid's internal architecture is consistent with a unique hydraulic elevation device. They hypothesize that the ancient architects used the purified water from the Dry Moat's south section to raise the heavy limestone blocks from the pyramid's centre in a "volcano" fashion. This innovative construction method would have significantly facilitated the building process.

The hydraulic lift system likely involved two main components: the twin shafts located north and south of the pyramid complex and a network of galleries descending up to 45m below ground level. The shafts contain granite boxes with removable plugs, which the researchers believe served as water inlets and outlets. As water flowed into the shafts, it would have lifted a large float carrying the stone blocks, allowing them to be precisely positioned at the desired height.

While further investigations are needed to fully understand the water flow dynamics and the historical water availability in the region, the study provides compelling evidence for using hydraulic power to construct ancient Egyptian pyramids. This discovery sheds light on the ancient Egyptians' engineering prowess in research avenues exploring the application of hydraulic technologies in ancient construction.

The authors emphasize that this work results from a collaborative effort between the newly established Paleotechnic Research Institute and several national laboratories. They state, "This work opens a new research line for the scientific community: the use of hydraulic power to build the pyramids of Egypt."

As we continue to unravel the mysteries of ancient engineering, the Pyramid of Djoser stands as a testament to our predecessors' ingenuity and technical abilities. The discovery of the hydraulic lift system reminds us that the ancient Egyptians were not only master builders but also innovative problem-solvers who leveraged their understanding of water management and engineering principles to create enduring wonders that continue to captivate us today.



(https://www.borntoengineer.com/ancient-egyptian-engineers-used-advanced-hydraulic-system-to-build-pyramids)

(Born to Engineer, August 2024, https://www.borntoengineer.com/ancient-egyptian-engineers-used-advanced-hydraulic-system-to-build-pyramids)

Αίγυπτος: Λύθηκε μυστήριο 4.500 ετών για το πώς κατασκευάστηκαν οι πυραμίδες (εικόνες)

Η υδραυλική μηχανική ενδέχεται πράγματι να υπήρξε η κινητήρια δύναμη πίσω από την κατασκευή των αρχαίων αιγυπτιακών πυραμίδων.

Η **υδραυλική μηχανική** ενδέχεται πράγματι να υπήρξε η κινητήρια δύναμη πίσω από την κατασκευή των αρχαίων αιγυπτιακών πυραμίδων.

Σε μια προδημοσίευση επιστημονικής εργασίας, ερευνητές κατέληξαν στο συμπέρασμα ότι η **Πυραμίδα του Τζόσερ στη Σακκάρα της Αιγύπτου** —η οποία θεωρείται η αρχαιότερη από τις επτά μνημειακές πυραμίδες και εκτιμάται ότι κατασκευάστηκε πριν από περίπου 4.500 χρόνια— προσφέρει ένα αξιοθαύμαστο υπόδειγμα υδραυλικής μηχανικής.

Η δύναμη του νερού στην ανύψωση των λίθων

Το υδραυλικά υποκινούμενο σύστημα θα μπορούσε να έχει μετακινήσει τα τεράστια πέτρινα μπλοκ που σχημάτισαν την πυραμίδα, ξεκινώντας από τη βάση προς την κορυφή. Η ερευνητική ομάδα υποστηρίζει ότι η εσωτερική αρχιτεκτονική της Πυραμίδας του Τζόσερ είναι **συμβατή με έναν μηχανισμό υδραυλικής ανύψωσης**, κάτι που δεν έχει ξαναπαρατηρηθεί σε εκείνη την τοποθεσία ή σε εκείνη την εποχή.

Σύμφωνα με τη μελέτη, με την ανύψωση των λίθων από το εσωτερικό της πυραμίδας με αυτό που οι συγγραφείς αποκαλούν **«ηφαιστειακό τρόπο»**, η πίεση του νερού από το υδραυλικό σύστημα θα μπορούσε να ωθήσει τα μπλοκ στη θέση τους. Αν επιβεβαιωθεί, η έρευνα αυτή δείχνει ότι οι αρχαίοι Αιγύπτιοι διέθεταν **προχωρημένες γνώσεις υδραυλικών συστημάτων**, πολύ νωρίτερα απ' όσο πίστευαν μέχρι σήμερα οι σύγχρονοι μελετητές. Το ερώτημα που γεννάται είναι: μη-

πως αυτή ήταν η πρώτη εφαρμογή ενός τέτοιου συστήματος ή είχε χρησιμοποιηθεί και παλαιότερα;

Η Πυραμίδα Τζόσερ στη Σακκάρα της Αιγύπτου / iStock

Όποια κι αν είναι η απάντηση, η υλοποίησή του στην Πυραμίδα του Τζόσερ θα αποτελούσε ένα **εξαιρετικά δύσκολο εγχείρημα**.

Το φράγμα του Gisr el-Mudir και η τεχνητή λίμνη

Η ομάδα εκτιμά, βάσει χαρτογράφησης των κοντινών λεκανών απορροής, ότι μία από τις **μαζικές και μέχρι σήμερα ανεξήγητες κατασκευές** της Σακκάρα —η περίφραξη **Gisr el-Mudir**— φέρει τα χαρακτηριστικά ενός **φράγματος ελέγχου** με σκοπό τη συγκράτηση ιζήματος και νερού. Η μορφολογία του εδάφους δυτικά του φράγματος υποδηλώνει την ύπαρξη μιας **προσωρινής λίμνης** δυτικά του συγκροτήματος του Τζόσερ, με το νερό να ρέει γύρω του σαν τάφρος.

Καθώς ένας παραπόταμος του Νείλου τροφοδοτούσε την περιοχή, ένα τέτοιο φράγμα θα μπορούσε να έχει δημιουργήσει **μια τεχνητή λίμνη**, η οποία πιθανώς συνέδεε τον ποταμό με μια «ξηρή τάφρο» γύρω από το συγκρότημα του Τζόσερ, εξυπηρετώντας τόσο τη **μεταφορά υλικών** όσο και τις **υδραυλικές ανάγκες** της κατασκευής.

Ένα σύστημα καθαρισμού νερού 4.500 ετών

«Οι αρχαίοι αρχιτέκτονες πιθανότατα ανύψωσαν τις πέτρες από το κέντρο της πυραμίδας με ηφαιστειακό τρόπο, χρησιμοποιώντας το καθαρό νερό χωρίς ιζήματα από το νότιο τμήμα της ξηρής τάφρου», γράφουν οι ερευνητές.

Σε ένα τμήμα της τάφρου, η ομάδα εντόπισε **μια μνημειώδη γραμμική κατασκευή λαξευμένη στον βράχο**, η οποία αποτελείται από διαδοχικά βαθιά τμήματα και συνδυάζει τεχνικά χαρακτηριστικά μιας **μονάδας επεξεργασίας νερού** — παρόμοιας με αυτές που χρησιμοποιούνται ακόμη και σήμερα—, περιλαμβάνοντας **δεξαμενή καθίζησης, δεξαμενή συγκράτησης και σύστημα καθαρισμού**.

«Μαζί, το Gisr el-Mudir και το εσωτερικό νότιο τμήμα της ξηρής τάφρου λειτουργούν ως **ενιαίο υδραυλικό σύστημα** που βελτιώνει την ποιότητα του νερού και ρυθμίζει τη ροή του για πρακτικούς και ανθρώπινους σκοπούς», αναφέρουν οι συγγραφείς, προσθέτοντας ότι η διαθέσιμη ποσότητα νερού στην περιοχή **ήταν επαρκής** για τις ανάγκες του έργου.

Οι ερευνητές καταλήγουν λέγοντας: «Οι αρχαίοι Αιγύπτιοι είναι γνωστοί για την πρωτοπορία και την τελειοποίησή τους στα υδραυλικά έργα — από τα αρδευτικά κανάλια έως τις μεταφορές τεράστιων λίθων με πλωτά μέσα. Η παρούσα εργασία ανοίγει έναν νέο ερευνητικό δρόμο: **τη χρήση της υδραυλικής δύναμης για την ανέγερση των μνημειακών κατασκευών των Φαραώ.**»

Πηγή: Popularmecanics.com

(HUFFPOST, 15 Οκτωβρίου 2025, https://www.huffingtonpost.gr/culture/aigyptos-lythike-mystirio-4-500-eton-gia-to-pos-kataskevastikan-oi-pyramides-eikones)

ΝΕΑ ΑΠΟ ΤΙΣ ΕΛΛΗΝΙΚΕΣ ΚΑΙ ΔΙΕΘΝΕΙΣ ΓΕΩΤΕΧΝΙΚΕΣ ΕΝΩΣΕΙΣ

ΕΛΛΗΝΙΚΗ ΕΠΙΣΤΗΜΟΝΙΚΗ ΕΤΑΙΡΕΙΑ ΕΔΑΦΟΜΗΧΑΝΙΚΗΣ & ΓΕΩΤΕΧΝΙΚΗΣ ΜΗΧΑΝΙΚΗΣ

2ο Ελληνο-Ρουμανικό Σεμινάριο Σεισμικής και Γεωτεχνικής Μηχανικής, Θεσσαλονίκη, 9 Οκτωβρίου 2025

Στις 9 Οκτωβρίου 2025 διοργανώθηκε στο Αριστοτέλειο Πανεπιστήμιο Θεσσαλονίκης το 2ο Ελληνο-Ρουμανικό Σεμινάριο Σεισμικής και Γεωτεχνικής Μηχανικής (2nd Greek-Romanian Seminar on Earthquake and Geotechnical Engineering, "Lessons learned from Earthquakes and Geotechnical Failures"). Την εκδήλωση παρακολούθησαν περισσότεροι από 40 συνάδελφοι. Η εκδήλωση αυτή αποτελεί το αποκορύφωμα της μέχρι σήμερα συνεργασίας μεταξύ των δύο επιστημονικών εταιρειών, της Ρουμανίας και της Ελλάδας, χάρη στις προσπάθειες του Γενικού μας Γραμματέα Γιώργου Μπελόκα που έφερε σε επαφή μέλη των δύο εταιρειών και την καλλιέργεια αυτών των σχέσεων από τους προέδρους τους, Loretta Batali και Μιχάλη Μπαρδάνη και άλλα μέλη των δύο επιστημονικών ενώσεων.

Από ελληνικής πλευράς παρουσίασαν οι Δημήτρης Πιτιλάκης, Ευαγγελία Γαρίνη, Εύη Ρήγα, Τάσος Αναστασιάδης (λόγω απρόοπτων καταστάσεων την παρουσίαση του κ. Αναστασιάδη την έκανε ο Κυριαζής Πιτιλάκης) και Μιχάλης Μπαρδάνης, ενώ από Ρουμανικής οι Loretta Batali, Dan Iancu και Alexandra Ene. Την εκδήλωση χαιρέτισαν με σύντομες προσφωνήσεις τους ο Πρόεδρος της Σχολής Πολιτικών Μηχανικών του ΑΠΘ, Γιάννης Ξενίδης, και ο Πρόεδρος του ΤΕΕ-Τμήμα Κεντρικής Μακεδονίας, Ηλίας Περτσινίδης. Η εκδήλωση ολοκληρώθηκε με συζήτηση στρογγυλής τραπέζης υπό τον συντονισμό του Γενικού μας Γραμματέα Γιώργου Μπελόκα και συμμετέχοντες τους Κυριαζή Πιτιλάκη, Γιώργο Γκαζέτα, Loretta Batali και Μιχάλη Μπαρδάνη. Το αναλυτικό πρόγραμμα των παρουσιάσεων είχε ως ακολούθως:

09:15-09:30	Opening Addresses **Michalis Bardanis**, President, Hellenic Society for Soil Mechanics and Geotechnical Engineering **Loretta Batali**, President, Romanian Society for Soil Mechanics and Foundation Engineering **Yiannis Xenidis**, Head, School of Civil Engineering, Aristotle University of Thessaloniki **Ilias Pertzinidis**, President, Technical Chamber of Greece — Section of Central Macedonia
09:30-10:15	**Dimitrios Pitilakis** *Urban-scale risk assessment including SSI and site amplification*
10:15-11:00	**Loretta Batali** *Forensic geotechnical, hydrological and hydrogeological analysis of instability phenomena occurred at a waste management centre*
11:00-11:15	Coffee Break
11:15-12:00	**Dan Iancu** & Horatiu Popa *Influence of pile stiffness on behaviour of slender base isolated structures*
12:00-12:45	**Alexandra Ene**, Horațiu Popa, Loretta Batali & Dragoș Marcu *Treatment of uncertainties for a deep excavation project in complex ground conditions*
12:45-13:30	**Evangelia Garini** *Soil Effects and Geotechnical failures in the 2023 Kahramanmaraş Earthquakes in Turkey*
13:30-14:30	Lunch Break
14:30-15:15	**Evi Riga** *Verification of seismic risk models using observed damage from past earthquake*
15:15-16:00	**Anastasios Anastasiadis** *Subsurface Structure and Dynamic Soil Properties as Basis for Microzonation and Site Effects Studies: Lessons Learned from Studies in Greece and Cyprus*
16:00-16:45	**Michalis Bardanis** *Identification, investigation and remediation of slow-moving landslides*
16:45-17:30	Discussion and Closing Panel **Kyriazis Pitilakis, George Gazetas, Loretta Batali, Michalis Bardanis** Moderator: **Giorgos Belokas**

Οι παρουσιάσεις των ομιλητών σε μορφή pdf έχουν ήδη αναρτηθεί μέσω του προφίλ της ΕΕΕΕΓΜ στο linkedin (www.linkedin.com/posts/hssmge-greece-5294a013_b_2ndgreromsem-activity-7387446551566090240-VvJt?utm_source=share&utm_medium=member_desktop&rcm=ACoAACIQzPEBIX3QZ-B3LEItWBk3QV4vR9Gs4Bo και www.linkedin.com/posts/hssmge-greece-5294a013b_1stromgresem-activity-7387448090582241280-ngN5?utm_source=share&utm_medium=member_desktop&rcm=ACoAACIQzPEBIX3QZ-B3LEItWBk3QV4vR9Gs4Bo) και οι μαγνητοσκοπημένες διαλέξεις θα αναρτηθούν σύντομα στο κανάλι της ΕΕΕΕΓΜ στο www.youtube.com/@thechannelofhssmge5899/videos.

Προετοιμάζονται ήδη αντίστοιχες εκδηλώσεις από τις δύο επιστημονικές εταιρείες για το 2026. **Προτρέπουμε έντονα τα μέλη μας να απευθυνθούν στην Εκτελεστική Επιτροπή της ΕΕΕΕΓΜ με τυχόν ιδέες και προτάσεις για το πώς θα ήθελαν να δουν να συνεχίζονται αυτές οι διμερείς συνεργασίες.**

Η ΕΕΕΕΓΜ ευχαριστεί ιδιαίτερα τους Άγγελο Τσινάρη και Τάσο Αναστασιάδη για την βοήθειά τους στη διοργάνωση αυτής της εκδήλωσης καθώς και τις εταιρείες που υποστήριξαν οικονομικά την εκδήλωση με την ευγενική τους χορηγία.

Αρχικές προσφωνήσεις από τους (από αριστερά προς τα δεξιά) Μιχάλη Μπαρδάνη, Πρόεδρο ΕΕΕΕΓΜ, Loretta Batali, Πρόεδρο SRGF, Γιάννη Ξενίδη, Πρόεδρο Τμήματος Πολιτικών Μηχανικών ΑΠΘ, και Ηλία Περτσινίδη, Πρόεδρο ΤΕΕ-Τμήμα Κεντρικής Μακεδονίας.

Οι ομιλητές και συμμετέχοντες στη συζήτηση στρογγυλής

τραπέζης στο 2ο Ελληνο-Ρουμανικό Σεμινάριο (από αριστερά προς τα δεξιά: Γ. Γκαζέτας, A. Ene, D. Iancu, Ε. Γαρίνη, Δ. Πιτιλάκης, Ε. Ρήγα, L. Batali, Κ. Πιτιλάκης, Γ. Μπελόκας και Μ. Μπαρδάνης).

Οι χορηγοί της εκδήλωσης!

ΕΛΛΗΝΙΚΗ ΕΠΙΤΡΟΠΗ ΣΗΡΑΓΓΩΝ ΚΑΙ ΥΠΟΓΕΙΩΝ ΕΡΓΩΝ

https://www.eesye.gr

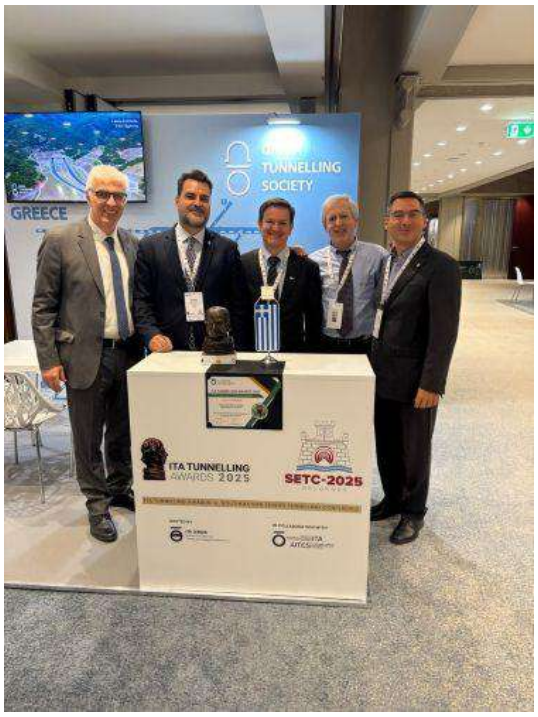
Σταθμός ΜΕΤΡΟ Θεσσαλονίκης «ΒΕΝΙΖΕΛΟΥ» 1ο βραβείο ITA στην κατηγορία "Elevated Thinking Underground: Shaping the Future"

Είμαστε στην ευχάριστη θέση να ανακοινώσουμε ότι το έργο του Σταθμού Μετρό Βενιζέλου στη Θεσσαλονίκη απέσπασε το 1ο βραβείο στην κατηγορία "Elevated Thinking Underground: Shaping the Future" στα hashtag#ITA Tunnelling Awards 2025, που πραγματοποιήθηκαν χθες στο Sava Center στο Βελιγράδι.

Η λύση αυτή συνδύασε με επιτυχία τεχνική καινοτομία, οικονομική βιωσιμότητα και προστασία της πολιτιστικής κληρονομιάς, αποσπώντας ευρεία αναγνώριση από την κοινωνία με την έναρξη λειτουργίας του Μετρό δημιουργώντας έναν ανασχεδιασμένο σταθμό, και το πρώτο και μεγαλύτερο «ζωντανό μουσείο» της πόλης.

Είναι μια μεγάλη τιμή για το Ελληνικό Μετρό και, φυσικά, για όλους τους μηχανικούς που εργάστηκαν σε αυτό το έργο αλλά και σε όλα τα έργα σηράγγων στην Ελλάδα.

Greek Tunnelling Society • 02.10.2025



30 Χρόνια Ελληνική Επιτροπή Σηράγγων και Υπογείων Έργων - Η ΕΕΣΥΕ γιόρτασε την επέτειο των 30 ετών από την ίδρυσή της

Η Ελληνική Επιτροπή Σηράγγων και Υπογείων Έργων (ΕΕΣΥΕ – Greek Tunnelling Society) γιόρτασε την 30ή επέτειό της, την Πέμπτη 23 Οκτωβρίου στην Αθήνα, με μία εμπνευσμένη εκδήλωση που ξεπέρασε κάθε προσδοκία.

Η γιορτή ένωσε ολόκληρη την «οικογένεια» της ΕΕΣΥΕ — μέλη, συνεργάτες, θεσμικούς εκπροσώπους και φίλους — σε μια βραδιά γεμάτη συγκίνηση, έμπνευση και αναδρομή σε τρεις δεκαετίες αφοσίωσης και συμβολής στην ανάπτυξη των υπόγειων έργων στην Ελλάδα.

Πέρα από την αναγνώριση της πλούσιας ιστορίας της, η εκδήλωση ανέδειξε με αυτοπεποίθηση το μέλλον του κλάδου των σηράγγων και των υπόγειων κατασκευών, επιβεβαιώνοντας τον ρόλο της ΕΕΣΥΕ ως κινητήριας δύναμης καινοτομίας, διάδοσης γνώσης και συνεργασίας.

Όπως τόνισε ο Πρόεδρος της ΕΕΣΥΕ, Καθηγητής Ανδρέας Μπενάρδος, «Ο τομέας των υπόγειων έργων στην Ελλάδα έχει εξελιχθεί σε πυλώνα βιώσιμης ανάπτυξης των υποδομών. Η ΕΕΣΥΕ θα συνεχίσει να προάγει την τεχνική αριστεία, την εκ-

παίδευση και τη συνεργασία — κοιτώντας με αισιοδοξία τα επόμενα 30 χρόνια.»

Τιμώντας τους Ιδρυτές

Κορυφαία στιγμή της βραδιάς αποτέλεσε η Τελετή Τιμητικών Βραβεύσεων, αφιερωμένη στα μέλη του πρώτου Διοικητικού Συμβουλίου της ΕΕΣΥΕ, για το όραμα και τα θεμέλια που έθεσαν το 1995:

- Δρ. Βάσω Σταυροπούλου, Πρόεδρος του
- Ομ. Καθ. Ιωάννης Οικονομόπουλος (†), Αντιπρόεδρος
- κ. Μενέλαος Κωνσταντάκος, Γενικός Γραμματέας
- Ομ. Καθ. Αλέξανδρος Σοφιανός, Εκδότης
- κ. Πέτρος Λασκαράτος, Ταμίας
- κ. Νικόλαος Καζίλης, 1ος Εκπρόσωπος της ΕΕΣΥΕ στην ITA-AITES
- κ. Ευάγγελος Κολώνιας (†), Μέλος

Ήταν ιδιαίτερα συγκινητικές οι στιγμές των βραβεύσεων και η παρουσία όλων των ανθρώπων που πέρασαν μέσα από την ΕΕΣΥΕ και μπόρεσαν να μεγαλώσουν την Επιστημονική μας Εταιρεία. Μέσα από αυτές τις βραβεύσεις, η ΕΕΣΥΕ εξέφρασε την ευγνωμοσύνη της προς όλους όσοι υπηρέτησαν και συνεχίζουν να υπηρετούν τον φορέα με αφοσίωση, πάθος και εθελοντικό πνεύμα επί τρεις δεκαετίες.

Ταυτόχρονα, έγινε η προβολή video με προσωπικές μαρτυρίες των μελών του 1ου ΔΣ καθώς και άλλων παλαιοτέρων προέδρων της ΕΕΣΥΕ το οποίο επιμελήθηκε η πολύ δραστήρια ομάδα νέων μελών της ΕΕΣΥΕ και ιδιαίτερα η κα. Ν. Σκεντέρας και οι κ.κ. Ν. Αντωνιάδης και Ι. Δράκος, και το οποίο μπορείτε να δείτε εδώ: https://lnkd.in/dcFS-zB6

Επίσημοι Προσκεκλημένοι και Κεντρικές Παρεμβάσεις

Την εκδήλωση τίμησαν με την παρουσία και τους χαιρετισμούς τους:

- ο Υφυπουργός Υποδομών & Μεταφορών κ. Νικόλαος Ταχιάος,
- ο Πρόεδρος της International Tunnelling and Underground Space Association (ITA-AITES) κ. *Andrea Pigorini*, και
- ο Πρόεδρος του ACUUS και Καθ. ΕΜΠ *Δημήτριος Καλιαμπάκος*.

Η κεντρική ομιλία πραγματοποιήθηκε από τον κ. Ιωάννη Μπακογιάννη, Μεταλλειολόγο Μηχανικό και πρώην Πρόεδρο της ΕΕΣΥΕ, με θέμα *«Στα υπόγεια είναι η θέα»*, αναδεικνύοντας τη βαθύτερη τεχνική και κοινωνική σημασία των υπόγειων έργων, αλλά και προσφέροντας πολύτιμες πληροφορίες και στοιχεία για το σύνολο των υπογείων έργων που έχουν κατασκευαστεί στην Ελλάδα.

Ιωάννης Μπακογιάννης

Μπροστά στο Μέλλον

Η βραδιά ολοκληρώθηκε με μία υψηλού επιπέδου συζήτηση πάνελ για το μέλλον των υπόγειων έργων στην Ελλάδα, με συντονιστή τον κ. Ιωάννη Φίκιρη, Διευθύνοντα Σύμβουλο της *ΕΔΑΦΟΣ Α.Ε.* και Αντιπρόεδρο της ITA-AITES. Στο πάνελ συμμετείχαν διακεκριμένοι εκπρόσωποι της πολιτείας αλλά και του κλάδου:

- Δημήτρης Αναγνώπουλος, Γενικός Γραμματέας Υποδομών
- Αναστάσιος Αρανίτης, Γενικός Διευθυντής, Aktor Group
- Βασίλης Καραγκιουλές, Γενικός Διευθυντής Έργων Υποδομών, ΜΕΤΚΑ
- Αλέξανδρος Μιχαηλίδης, Αναπληρωτής Διευθύνων Σύμβουλος & Γενικός Τεχνικός Διευθυντής, TERNA S.A.
- Νικόλαος Ρηγόπουλος, Τεχνικός Διευθυντής, AVAX Group

Η εκδήλωση πραγματοποιήθηκε στο Anassa City Events στην Αθήνα με την επιμέλεια της AFEA Congress και ολοκληρώθηκε με ένα κοκτέιλ στον κήπο που έδωσε την ευκαιρία σε όλους να περάσουν μια όμορφη βραδιά.

Ελληνικός Σύνδεσμος Γεωσυνθετικών Υλικών (ΕΣΓΥ)
IGS Greece (HGS).

20 χρόνια Ελληνικός Σύνδεσμος Γεωσυνθετικών Υλικών

Αισθανόμαστε μεγάλη ευγνωμοσύνη σε όσες και όσους ίδρυσαν, υπηρέτησαν και μεγάλωσαν τον Σύνδεσμό μας.

Ο IGS Greece (HGS) παραμένει αρωγός της ακαδημαϊκής κοινότητας, των μηχανικών (μελετητών και κατασκευαστών), των παραγωγών και όλων όσων δραστηριοποιούνται στα γεωσυνθετικά υλικά.

Έχοντας μέλη από όλους τους πυλώνες παραγωγής γνώσης και έργων στην Ελλάδα, σταθερές σχέσεις και εφαρμογή των δράσεων του International Geosynthetics Society (IGS), με ενότητα και όραμα ξεκινάμε το ταξίδι για την επόμενη επέτειό μας.

Θερμές ευχαριστίες στα μέλη του IGS Greece (HGS) για τη συμμετοχή τους στον Σύνδεσμο και στις δράσεις μας, στον International Geosynthetics Society (IGS) για την υποστήριξή του, στην HSSMGE Greece για τις εποικοδομητικές συνέργειες και στα μέλη του ΔΣ για την άριστη, παραγωγική και πάντα ευχάριστη συνεργασία.

(11.10.2025, Χρήστος Στρατάκος, Γραμματέας ΕΣΓΥ)

Ελληνικό Τμήμα Αντισεισμικής Μηχανικής

Αντισεισμικές Συναντήσεις

Η Εκτελεστική Επιτροπή του Ελληνικού Τμήματος Αντισεισμικής Μηχανικής, αποφάσισε την παραγωγή της σειράς "Αντισεισμικών Συναντήσεων".

Μιας ιδέας που αφορά σειρά συνεντεύξεων διακεκριμένων επιστημόνων και μηχανικών στο αντικείμενο της Αντισεισμικής Μηχανικής με στόχο την καταγραφή και διατήρηση της ιστορίας ανάπτυξης της Αντισεισμικής Μηχανικής στη χώρα μας.

Μεθοδολογίες που εφαρμόζουμε σήμερα, θεωρώντας τες δεδομένες, προήλθαν από συστηματική έρευνα, εγχώριες και διεθνείς συνεργασίες, και εργασίες πεδίου μετά από σημαντικούς σεισμούς στην Ελλάδα.

Μηχανικοί που συνέβαλαν στην εξέλιξη της αντισεισμικής μηχανικής θα μας διηγηθούν την ιστορία όπως την διαμόρφωσαν και βίωσαν μέσα από τη δική τους οπτική.

Ο κύκλος συνεντεύξεων θα διευρύνεται συνεχώς, προσπαθώντας να υπάρχει αντιπροσωπευτικότητα από όλα τα ερευνητικά ιδρύματα και γνωστικά ή επαγγελματικά πεδία, ανάλογα και με τη διαθεσιμότητα των επιστημόνων που προσκαλούνται.

Για τους πιο έμπειρους μηχανικούς οι "Αντισεισμικές Συναντήσεις" θα αποτελέσουν καταγραφή αναμνήσεων, ενώ για τους πιο νέους θα έχουν εκπαιδευτικό χαρακτήρα συμβάλλοντας στην κατανόηση της τρέχουσας γνώσης και κανονισμών.

Κάθε "Αντισεισμική Συνάντηση" θα συνοδεύεται από οπτικοακουστικό υλικό, στην μορφή podcast, αλλά και συνοδευτικό τεύχος σε μορφή pdf.

Ευελπιστούμε να βρείτε τις «Αντισεισμικές Συναντήσεις» ενδιαφέρουσες και χρήσιμες.

Συνάντηση με Θεοδόση Τάσιο

Στο πλαίσιο της σειράς **«Αντισεισμικές Συναντήσεις»**, επισκεφθήκαμε τον **καθηγητή Θεοδόση Τάσιο** στο γραφείο του, όπου μας υποδέχθηκε με την χαρακτηριστική του απλότητα και ευγένεια.

Με τον γνώριμο συνδυασμό επιστημονικής ακρίβειας και ανθρώπινης ματιάς και το οξύ πνεύμα που τον συνοδεύει σε κάθε του αφήγηση, ο Καθηγητής Θεοδόσης Τάσιος μοιράστηκε στιγμές από την πορεία της **Αντισεισμικής Μηχανικής στην Ελλάδα**, από τα πρώτα βήματα των ελληνικών κανονισμών της δεκαετίας του 1950, έως τη διαμόρφωση του σύγχρονου **Ευρωκώδικα 8 (EC8)**.

Η συζήτηση εξελίχθηκε σε ένα ταξίδι γνώσης και μνήμης, φωτίζοντας τις προσπάθειες, τις ιδέες και τους ανθρώπους που θεμελίωσαν τη σύγχρονη ελληνική αντισεισμική μηχανική.

https://www.youtube.com/watch?v=QiLfnNS8e2M

Λήψη PDF τεύχους

Πανεπιστήμιο Θεσσαλίας
Τμήμα Πολιτικών Μηχανικών

Εκπαιδευτική εκδρομή του Τομέα Γεωτεχνικής και Γεωπεριβαλλοντικής Μηχανικής

Στις 16.10.25 έλαβε χώρα εκπαιδευτική εκδρομή του Τομέα Γεωτεχνικής και Γεωπεριβαλλοντικής Μηχανικής (**geo_civil.uth**) του Τμήματος Πολιτικών Μηχανικών (**Civil Engineering - University of Thessaly**) του Πανεπιστημίου Θεσσαλίας στο υπό κατασκευή φράγμα Αγιόκαμπου στη θέση Αγιόκαμπος – Λιβαδότοπος του Νομού Λάρισας στη Περιφερειακή Ενότητα Θεσσαλίας. Κατά την διάρκεια της εκδρομής επισκεφθήκαμε τα επί μέρους έργα που αφορούν στη θεμελίωση, στεγανοποίηση και κατασκευή του σώματος του φράγματος, στον υπερχειλιστή, στη σήραγγα εκτροπής και σε έργα υδροληψίας και εκκένωσης. Οι συνοδοί καθηγητές (Π. Ντακούλας, Π. Καλλιόγλου, Γρ. Τσινίδης και Γ. Εφραιμίδης) και οι φοιτητές/φοιτήτριες εκφράζουμε τις θερμές μας ευχαριστίες προς την ανάδοχο εταιρεία ΙΝΤΕΡΚΑΤ Α.Ε. – ΑΦΟΙ ΠΑΠΑΙΩΑΝΝΟΥ (**INTERKAT SA**) για την άριστη φιλοξενία της, την άρτια παρουσίαση του έργου και την ευγενική προσφορά της σε προστατευτικό εξοπλισμό, καθώς και την Ε.Υ.Δ.Ε. ΘΕΣΣΑΛΙΑΣ. Επίσης, οι καθηγητές ευχαριστούμε τους φοιτητές και τις φοιτήτριες για τη συμμετοχή τους, την υποδειγματική τους συμπεριφορά, καθώς επίσης τον ενθουσιασμό και το ενδιαφέρον που υπέδειξαν.

Γρηγόρης Τσινίδης
Επίκουρος Καθηγητής

Το ΤΕΕ και το ΥΠΠΟ διοργάνωσαν ημερίδα με τίτλο: **"Ιστορικές Γέφυρες στην Ελλάδα"**, η οποία διεξήχθη στις 15 Οκτωβρίου 2025 στο αμφιθέατρο "Δημήτρης Παντερμαλής" του Μουσείου Ακρόπολης.

ΠΡΟΓΡΑΜΜΑ ΗΜΕΡΙΔΑΣ

Χαιρετισμοί

10:00 **Στασινός Γεώργιος,** Πρόεδρος ΤΕΕ
Διδασκάλου Γεώργιος, Γενικός Γραμματέας ΥΠΠΟ

Ομιλίες

10:10 **Τάσιος Θεοδόσης**, Ομότιμος Καθηγητής ΕΜΠ
«Εύριπος: 2500 χρόνια συνεχούς γεφύρωσης»

10:30 **Βιντζηλαίου Ελισάβετ**, Ομότιμη Καθηγήτρια ΕΜΠ
«Γέφυρα Πλάκας και Γέφυρα Κόνιτσας: Τεκμηρίωση φέροντος οργανισμού και συμπεριφοράς»

10:50 **Γιαννέλος Χρήστος**, MSc Πολιτικός Μηχανικός
«Προστασία και Αποκατάσταση Ιστορικών Λίθινων Γεφυρών, Κρίσιμες Παράμετροι – Πρόσφατα Παραδείγματα»

11:10 **Τάκος Χρήστος**, MSc Αρχιτέκτονας Μηχανικός
«Γέφυρες Ξηροκαμπίου, Νερούτσου, Πλάκας και Κερίτη: αρχές και μεθοδολογία των μελετών αποκατάστασης»

11:30 **Κασκάνης Βασίλειος,** Προϊστάμενος ΥΝΜΤΕΗΒΙΔΜ ΥΠΠΟ
«Μελέτη και Εργασίες Αποκατάστασης Γέφυρας Σπανού Γρεβενών»

11:50 Συζήτηση

12:20 Διάλειμμα

Ομιλίες

12:50 **Κορρές Μανόλης**, Ομότιμος Καθηγητής Ε.Μ.Π.
«Γεφυροποιία: γενικά (αρχές-τύποι) και ένα παράδειγμα»

13:10 **Παπαηλίου Νικόλας**, Πολιτικός Μηχανικός Ε.Μ.Π.
«Τοξωτές Γέφυρες Οπλισμένου Σκυροδέματος στην Ελλάδα»

13:30 **Κολώνας Χρήστος,** Πολιτικός Μηχανικός ΥΝΜΤΕΔΕΠΝΙ ΥΠΠΟ
«Συνήθεις βλάβες και κίνδυνοι σε ιστορικά γεφύρια στις περιοχές Πελοποννήσου, Δυτικής Ελλάδας και Νοτίου Ιονίου»

13:50 **Κάντζος Θεόδωρος**, Πολιτικός Μηχανικός Ε.Μ.Π.
«Γέφυρες τύπου INGLIS στην Ελλάδα»

14:10 **Ποζιόπουλος Άρης**, τ. Προϊστάμενος Μελετών Μεταβυζαντινών Μνημείων ΔΑΒΜΜ ΥΠΠΟ
«Η Γέφυρα De Bosset Αργοστολίου και η Διάσωσή της»

14:30 Συζήτηση

Τη συζήτηση συντόνισε η Δρ. **Αμαλία Ανδρουλιδάκη**, *Προϊσταμένη Γενικής Διεύθυνσης Αναστήλωσης, Μουσείων και Τεχνικών Έργων ΥΠΠΟ*

Ο σύνδεσμος για απομακρυσμένη παρακολούθηση της ημερίδας: https://youtube.com/live/th8vKbDK6YA

ΕΛΛΗΝΙΚΗ ΔΗΜΟΚΡΑΤΙΑ
Υπουργείο Πολιτισμού

ΤΕΕ ΤΕΧΝΙΚΟ ΕΠΙΜΕΛΗΤΗΡΙΟ ΕΛΛΑΔΑΣ

Ιστορικές Γέφυρες στην Ελλάδα

International Society for Soil Mechanics and Geotechnical Engineering

ISSMGE News
www.issmge.org/news

Joint ISSMGE - Heritage Time Capsule (HTC) & CAPG Session at Geotech Asia 2025 (7-10 October), Goa

ISSMGE IT Administrator / Corporate Associates / 01-10-2025

The Joint ISSMGE-Heritage Time Capsule (HTC) & the Corporate Associates Presidential Group (CAPG) session will be held during Geotech Asia 2025 in Goa.

Themed "Geotechnical Industry Footprint: Reimagining the Boundaries of our Profession", this session brings together global experts to reflect on the past, evaluate the present, and envision the future of the geotechnical profession.

Event Details

- Venue: Taj Cidade de Goa Horizon, Goa
- Date: 10th October 2025
- Time: 2:00 PM - 3:30 PM

Panelists

- **Yuli Douala-Rigby** Vice Chair, BGA, Development & Chief Civil Engineer, Tensar
- **Walter Paniagua** ISSMGE VP (North America), Founder and CEO of PILOTEC
- **Ricardo Justiniano** Civil Engineer, JETsj Geotechnica Lda
- **Ravikiran Vaidya** Principal Engineer & Director, Geo Dynamics
- **Ashish Gharpure** Managing Director, Genstru Consultants Pvt. Ltd.
- **Ritvick Bhalla** Chief Growth Officer, Encardio Rite Group

Moderators

- **Dr. Neelima Satyam** Professor, IIT Indore
- **Dr. Hugo Acosta-Martinez** Technical Director, WSP Australia

Download leaflet HTC-ISSMGE, CAPG 10-10-25.pdf

Engaging Young Minds in France: Spotlight on CFMS-Jeunes

Max Barbosa / Young Members / 02-10-2025

Engaging Young Minds in France: Spotlight on CFMS-Jeunes

CFMS-Jeunes is the dynamic young members group of the *Comité Français de Mécanique des Sols et de Géotechnique* (CFMS), Frances national society for soil mechanics and geotechnical engineering. Open to all members under 35, CFMS-Jeunes plays a key role in fostering engagement, knowledge sharing, and professional development among the next generation of French geotechnical professionals.

Empowering Young Professionals Through Collaboration

Structured around a dynamic board and specialized thematic committees including communication, international networking, and event organization CFMS-Jeunes empowers young engineers and researchers to engage actively with the CFMS. The group serves not only as a platform for professional development but also as a welcoming gateway for new members to connect with peers and become part of the broader geotechnical community.

Regular Initiatives and Events

CFMS-Jeunes organizes a variety of engaging activities throughout the year, including:

- **Technical Webinars** on PhD research or practical engineering topics;
- **Science Communication Campaigns**, such as educational videos and social media outreach;
- **Creative Competitions**, including photography contests to promote geotechnical visibility;
- **Networking Opportunities**, fostering connections within France and with international societies.

Board meetings and volunteer sessions are held every two months to review progress, brainstorm new initiatives, and ensure a consistent and inclusive approach to young member engagement.

We would love to hear from your YMPG group too!

To contribute an update or video from your countrys Young Members Group, please write to: ympg.issmge@gmail.com

Lets keep sharing and learning together across borders!

CALL FOR NOMINATIONS FOR ISSMGE AWARDS AT 21st ICSMGE, VIENNA 2026 (DEADLINE EXTENSION: 31 DECEMBER 2025)

ISSMGE IT Administrator / General / 06-10-2025

The International Society for Soil Mechanics and Geotechnical Engineering (ISSMGE) invites nominations for its prestigious awards, recognizing members who have made outstanding contributions to our profession, society, and the world.

The following awards are open for nominations for presentation at the 21st International Conference on Soil Mechanics and Geotechnical Engineering (21st ICSMGE) to be held in Vienna, Austria, in 2026:

- ISSMGE Outstanding Technical Committee Award

- ISSMGE Outstanding Geotechnical Project Award
- ISSMGE Outstanding Innovator Award
- ISSMGE Outstanding Member Society Award
- ISSMGE Outstanding Paper Published in the International Journal of Geo-Engineering Case Histories Award
- ISSMGE Outstanding Public Relations Award
- ISSMGE Outstanding Young Geotechnical Engineer Award

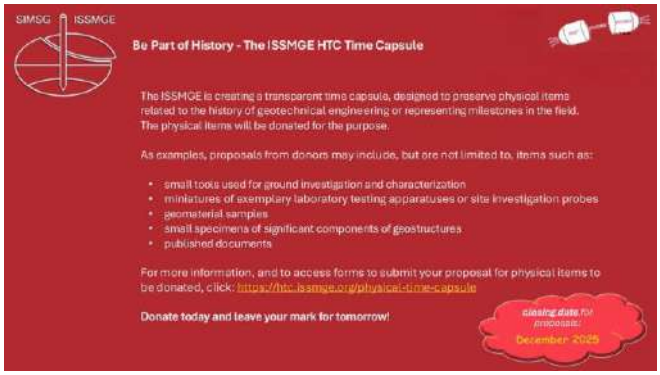
Guidelines for the nomination of each award can be found through the links provided on the ISSMGE website.

Updated deadline for submissions: 31 December 2025

All nominations must be made through the local ISSMGE Member Society (except for the Outstanding Paper Award and the Outstanding Technical Committee Award) and must reach the ISSMGE Secretariat by the stated deadline, in time for the awards presentation at the 21st ICSMGE in Vienna, 2026.

Contribute to the Heritage Time Capsule Before December 2025

Max Barbosa / Young Members / 06-10-2025



The **Heritage Time Capsule (HTC)** project is one of the most ambitious and visionary initiatives ever undertaken by the ISSMGE. As we prepare to seal a **physical time capsule in 2026**, now is the time to ensure your contribution is included in this historic global record of geotechnical engineering.

What Is the HTC?

The HTC project aims to preserve the **legacy and evolution of geotechnical engineering** over the last 100 years while setting the stage for the next century. Through the HTC website https://htc.issmge.org members from across the globe have already contributed **over 100 pieces**, including articles, videos, interviews, and reflections from societies, technical committees, and individuals.

A **physical 1m³ capsule**, transparent and multi-compartmented, will be sealed at the **21st ICSMGE in Vienna in 2026**, not to be opened until **2126**.

Final Call for Submissions Until December 2025

We encourage all **ISSMGE Member Societies, Technical Committees, Corporate Associates, Past Presidents, Key Persons, and Board-Level Committees** to contribute to this unique legacy project. Contributions can be:

- Personal reflections or interviews
- Reports and histories of your society or region
- Technical innovations, lessons learned, or case histories
- Videos or multimedia material
- Retrospectives on foundational figures or practices in your area

Even if you have already contributed, **updates and additional content are welcome**.

Submit your material via the HTC website: https://htc.issmge.org

Become a Discoverer

Alongside contributions, ISSMGE invites individual members to participate as **HTC Discoverers**, highlighting and reflecting on existing HTC entries. This is part of **Phase 2 Discovery**, including a **£3,000 prize pool** in the 2025 Discoverer Report Competition.

This is an opportunity to **engage with our profession's heritage**, gain visibility, and contribute to shaping its future.

Questions?

Contact the HTC team directly via the **Contact** tab on the HTC website: https://htc.issmge.org/contact

Join us in preserving our professions past and shaping its future contribute to the HTC before December 2025.

Be Part of History: The ISSMGE's Transparent Time Capsule

ISSMGE IT Administrator / Time Capsule Project / 08-10-2025

The International Society for Soil Mechanics and Geotechnical Engineering (ISSMGE) is building a transparent time capsule to preserve the history of geotechnical engineering. This capsule will hold physical items that show how the field has grown and changed over time.

The ISSMGE invites engineers, researchers, and institutions to donate small items that represent important moments or milestones in geotechnical work. Each contribution will help future generations understand the tools, materials, and ideas that shaped todays practice.

Donors may propose items such as:

- Small tools used for ground investigation or soil testing
- Miniatures of laboratory or field testing equipment
- Samples of geomaterials
- Small parts from important geostructures
- Published documents that mark key achievements

By donating, you can help tell the story of geotechnical engineering and leave a mark for the future.

To learn more or to submit a proposal, visit https://htc.issmge.org/physical-time-capsule.

The deadline for proposals is December 2025.

Join the ISSMGE HTC Time Capsule project donate today and be part of history!

Inspiring Global Pursuits: Indonesia Launches the SOIL Webinar Series

Max Barbosa / Young Members / 15-10-2025

The Young Members Group of **HATTI** (Indonesias National Geotechnical Society) has launched a new and inspiring initiative for 2025: the **SOIL Series Sharing of International Learning**.

This **bimonthly webinar series** highlights the personal and academic journeys of Indonesian geotechnical engineers who have pursued or are currently pursuing studies abroad. Each session provides invaluable first-hand insight into:

- Academic and research experiences in different countries
- Daily living expenses (e.g., housing, food, transportation)
- Scholarship application procedures and eligibility
- Challenges and personal growth during international education

By sharing these stories, the SOIL Series aims to **motivate and guide** aspiring Indonesian students to pursue **postgraduate studies abroad** in geotechnical engineering and related fields.

Community Impact

The webinars have fostered **open dialogue and peer support**, helping build a community of globally minded young geotechnical professionals. Despite the presentations being delivered in Indonesian, the PowerPoint slides are in English, making them accessible to a broader audience.

You can rewatch the webinars on HATTIs official YouTube channel: https://www.youtube.com/@HATTIAMM

Get Involved!

This initiative is part of the broader **YMPG News** campaign, showcasing activities from young geotechnical professionals around the world.

Check out other recent YMPG highlights:

- Empowering the Next Generation: US YMG Highlights
- Engaging Young Minds in France CFMS Jeunes

We would love to hear from your YMPG group too! To contribute an update or video from your country's Young Members Group, please write to: ympg.issmge@gmail.com

Lets keep sharing and learning together across borders!

ISSMGE TC217 3rd Annual Online Seminar Series: Application of Piezo Drive Cone Test (PDC) and Multichannel Analysis of Surface Waves (MASW) in Taiwan and Japan, 30 October 2025

Siau Chen Chian / TC217 / 16-10-2025

The executive committee of TC217 is hosting a trilogy of webinars on topics relating to land reclamation. This is the third consecutive year that TC217 has conducted the online seminar series, under the auspicious of the ISSMGE.

We are pleased to announce our invited speakers for our webinar on 30 October 2025, Prof Louis Ge from National Taiwan University, and Yuta Toyoshima from OYO Corporation.

Seminar details:

Title: Application of Piezo Drive Cone Test (PDC) and Multichannel Analysis of Surface Waves (MASW) in Taiwan and Japan

Date and Time : 30 October 2025, 6.30pm (GMT +8h)

Registration link: https://us06web.zoom.us/webinar/register/WN_plfKUZVCTdqYGNq86CI0DA#/registration

*Leave "N.A." for non-applicable fields in the form.

We look forward to receiving your registration and meeting you at the webinar!

Sincerely
A/Prof Darren Chian
Secretary, TC217 Land Reclamation

ISSMGE establishes UAE chapter — first in the GCC region

ISSMGE IT Administrator / General / 20-10-2025

The International Society for Soil Mechanics and Geotechnical Engineering (ISSMGE) has officially launched the ISSMGE UAE Chapter, marking a historic milestone as the first ISSMGE member society in the Gulf Cooperation Council (GCC) region.

The new chapter strengthens the UAEs role in advancing geotechnical engineering and creates a platform for regional cooperation, knowledge exchange, and innovation across the Middle East. The ISSMGE UAE Chapter will connect local engineers and academics with the global geotechnical community of 91 Member Societies and more than 20,000 professionals.

The founding leadership of the ISSMGE UAE Chapter includes:

- Prof. Ghanim Kashwani, PhD, CEng, FICE President
- Prof. Dr. Marwan Alzaylaie Vice President
- Prof. Zahid Khan Founding Member

Special Issue on Environmental Geotechnics by ISSMGE TC215 Published

ISSMGE IT Administrator / TC215 / 31-10-2025

We are pleased to announce the Special Issue #3 of Volume #8 of the International Journal of Geoengineering Case Histories, an official Journal of the International Society for Soil Mechanics and Geotechnical Engineering (ISSMGE).

This Special Issue of the ISSMGE International Journal of Geoengineering Case Histories, edited by Guest Editor Prof. Andrea Dominijanni, ISSMGE TC215 Chair, focuses on the broader area of environmental geotechnics and soil behavior. Originally envisioned as an opportunity to publish case histories presented at the 9th International Congress on Environmental Geotechnics, held in Chania, Crete, on June 2528, 2023, the issue was later expanded through a public call for papers to include contributions addressing soil behavior issues associated with the built environment.

Papers published in this refereed journal are freely available in color and are accompanied by databases that include the

electronic data presented in the paper as well as additional figures (as necessary). The locations of the case histories are also positioned in the IJGCH Geographic Database.

Click the links below to download and read the papers of the latest issue of the journal and access the digital data.

Papers published in this journal are downloaded thousands of times worldwide. Please consider the International Journal of Geoengineering Case Histories for the publication of well-documented case histories.

Paper Title: Editorial, pp. i
Authors: Andrea Dominijanni, Dimitrios Zekkos
Click to download

Paper Title: Analyzing the Field Performance of a GM-GCL Landfill Bottom Lining System, pp. 1-11
Authors: Leslie Okine, Poyu Zhang, Tarek Abichou, Jiannan Chen
Click to download

Paper Title: Application of Phytotechnologies for the Control of Wind Erosion and Landscape Rehabilitation of a Filtered Tailings Deposit in the Atacama Region, Chile, pp. 12-29
Authors: Pamela Valenzuela, Juan Palma, Osvaldo Moreno, Claudia Ortiz, Claudio Masson
Click to download

Paper Title: Pont de Pierre of Bordeaux Data Monitoring Analysis: Applications of HST and BDLM Models and Benefits for Reinforcement Works, pp. 30-54
Authors: Gilles Valdeyron
Click to download

Paper Title: Uplift Load Monitoring for Two Bored Piles in Shrink-swell Soil, pp. 55-70
Authors: Jean-Louis Briaud, Jerome Sfeir
Click to download

About the journal and this announcement

The ISSMGE International Journal of Geoengineering Case Histories is an official journal of the International Society for Soil Mechanics and Geotechnical Engineering, focusing on the publication of well- documented case histories.

The truly open-source mission of the journal is funded annually by companies and organizations that have an action-based commitment to the advancement of the geoengineering profession. These organizations are acknowledged on our website and in every single paper of the journal. More information on our funding program can be found here. Send us an email if you are interested in being part of this unique publication.

IJGCH is proudly funded by Dar Group, Geosyntec Consultants, ConeTec and ENGEO. Our sponsors make possible the circulation of the journal to thousands of readers at no cost.

Bridging Generations in Geotechnics: Macedonian YMPG at EYGEC 2025 and Looking Ahead to Eurock 2026

Max Barbosa / Young Members / 31-10-2025

Members of the **Macedonian Association for Geotechnics (MAG)** were actively involved in the 7th *European Young Geotechnical Engineers Conference (EYGEC 2025)*, held in Rijeka, Croatia. The event brought together nearly 50 young geotechnical professionals from across Europe for a vibrant exchange of knowledge and experience.

At the opening session, **Prof. Milorad Jovanovski** of MAG delivered an inspiring address to young engineers, emphasizing the importance of international collaboration and continued learning. Representing MAG, **Mr. Toni Kitanovski** presented the paper *Shear Wave Velocity Development in Natural Sand under Triaxial Loading,* contributing valuable insights to the technical discussions.

This participation underscores MAGs ongoing commitment to supporting young geotechnical professionals by fostering opportunities for visibility, networking, and engagement in the broader international community.

On the Horizon: EUROCK 2026 in Skopje

Looking ahead, MAG will host a major international event: **EUROCK 2026 ISRM Regional Symposium**, which will take place from **15 to 19 September 2026** in **Skopje, Macedonia**.

Organized in collaboration with the International Society for Rock Mechanics and Rock Engineering (ISRM), the symposium promises to be a key gathering for geotechnical and rock mechanics experts. Young members are encouraged to contribute their work and take part in the technical and cultural exchange.

Key Dates

- **Abstract Submission Deadline:** 15 November 2025
- **Registration Opens:** 1 January 2026
- More info at www.eurock2026.com

Get Involved!

This initiative is part of the broader **YMPG News campaign**, showcasing activities from young geotechnical professionals around the world.

Check out other recent YMPG highlights:

- Inspiring Global Pursuits: Indonesia Launches the SOIL Webinar Serie
- Engaging Young Minds in France: CFMS Jeunes

We would love to hear from your YMPG group too! To contribute an update or video from your country's Young Members Group, please write to: ympg.issmge@gmail.com

Lets keep sharing and learning together across borders!

https://issmge-e.eu

Dear colleagues,

Hopefully you've received the **ISSMGE Europe Autumn Newsletter**, distributed last week, and found its contents

both informative and inspiring. We also hope you've had the chance to share it with your national society members:

Access the newsletter here

With the Autumn edition now behind us, we are preparing the **Winter Newsletter**, to be released in mid-December. We warmly welcome your contributions; whether they relate to recent events, upcoming initiatives, youth engagement, research highlights, or other news or announcements from your society.

Deadline for submissions: 30 November 2025
Please send your content to vpeurope.issmge@epfl.ch

Thank you in advance for helping us continue to showcase the strength, diversity, and dynamism of the European geotechnical community.

Warm regards,
Prof. Lyesse Laloui
Vice President for Europe
ISSMGE

ISRM International Society for Rock Mechanics and Rock Engineering

News

https://www.isrm.net

New ISRM Suggested Method video - SM for Determining the Abrasivity of Rock by the CERCHAR Abrasivity Test 2025-10-27

A video on the Suggested Method for Determining the Abrasivity of Rock by the CERCHAR Abrasivity Test was prepared by the Rock Mechanics Laboratory, Department of Energy Resources Engineering of the Pukyong National University, Republic of Korea.

Click to watch the Suggested Method video.

Proceedings of the 1968 ISRM International Symposium, in Madrid 2025-10-29

The proceedings of the 1968 ISRM International Symposium that took place in Madrid, Spain, are now available on the ISRM digital library through OnePetro.org

Abstract submission deadline for LARMS2026 extended to 15 November 2025-10-31

The deadline for submission of abstracts to the 10th Latin American Rock Mechanics Symposium (LARMS 2026) was extended to 15 November.

LARMS 2026 will take place from 26 to 28 August 2026 in Brasília, Brazil and is the 2026 ISRM Regional Symposium for Latin America.

For more information visit the conference website: https://larms2026.com/

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

News

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

ITA Tunnelling Awards 2025: Honouring Global Excellence 01 October 2025

The ITA Tunnelling Awards 2025 in Belgrade celebrated outstanding projects, technologies, and young talent, recognising innovation and excellence across the underground infrastructure industry.

The ITA Tunnelling Awards of 2025 have once again honoured the very best in underground infrastructure. Since its inception in 2015, the Awards have become a coveted accolade, celebrating achievements that shape the future of tunnelling and underground construction.

Industry Diversity

This year's winners and highly commended finalists represent 11 countries and showcase the diversity of the industry: from rail, metro, and road projects to water and wastewater treatment, immersed tubes, TBM and drill and blast applications, rehabilitation works, and initiatives that inspire young minds and uplift minority communities. Notably, six exceptional young professionals were recognised for their contributions and potential to lead the industry forward.

ITA President's Message

The trophy itself pays tribute to the legacy of Marc and Isambard Kingdom Brunel, pioneers whose innovations in shield excavation and concurrent tunnel lining laid the foundations for modern tunnelling. Their soft ground subaqueous tunnel under the River Thames remains a vital part of London's Underground today.

"*Here in Belgrade, we celebrate the exceptional quality of the projects and technologies presented by our finalists, as well as the strength and inspiring achievements of the young tunnellers who have shown us such talent and passion. Let me underline that all the projects presented are winners. Each of them represents innovation, commitment, and excellence in our industry. This is why every finalist will receive the same*

Brunel trophy or the Brunel medal — a prestigious symbol of recognition that honours your contribution to underground engineering worldwide," says ITA President Andrea Pigorini.

Celebrating Achievement

Congratulations to all winners, finalists, and entrants of the 2025 ITA Tunnelling Awards. The call for nominations for the 2026 Awards will open in Spring, with the symposium and trophy presentations set for Lisbon, in partnership with the Portuguese Tunnelling and Underground Space Commission (CPT) and its 20th Anniversary Celebration Conference from 4–6 November 2026.

You can find the complete list of ITA Tunnelling Awards 2025 winners, along with detailed descriptions of their projects, here.

ITA WTC2026 registration is open 01 October 2025

Registration is now open for the ITA World Tunnel Congress 2026, taking place in Montréal, Canada from 16-20 May 2026.

The congress will explore the theme *Connecting Communities through Underground Infrastructure,* highlighting the vital role of underground solutions in linking cities, regions and people through sustainable and resilient infrastructure.

Muir Wood Lecture

The Opening Ceremony will be held on Monday, 18th May 2026, marking the official start of the congress. During the ceremony, the prestigious Muir Wood Lecture will be delivered by Remo Grandori, nominated by the Italian Tunnelling Society and selected by the ITA Executive Council.

Remo Gandori will speak on the role of tunnel boring machines (TBMs) in large-scale underground construction, focusing on challenges, innovations, and logistics.

ITA's flagship

The ITA World Tunnel Congress (ITA WTC) is the ITA's flagship annual event, bringing together professionals, researchers, and decision-makers from around the globe to exchange knowledge, showcase innovations, and advance the tunnelling and underground space industry.

Each year, the Congress features technical sessions, keynote lecturers, ITA Working Group and Committee meetings, the ITA General Assembly, and networking opportunities that foster collaboration across disciplines and boarders.

The 2026 Congress host city Montréal is a city well known for its vibrant culture, creativity, and engineering excellence. Located on an island in the St Lawrence River, Montréal offers a dynamic setting for international dialogue and discovery – making it an ideal backdrop for this global gathering.

Sign up early

Delegates are encouraged to register early, especially in light of the Formula One Race Weekend beginning on 22nd May 2026, which may impact hotel availability and logistics in Montréal.

Register now via the official ITA WTC2026 website and explore travel details at www.wtc2026.ca

Message from the ITA President 02 October 2025

What a memorable few days we shared in Belgrade for the 11th ITA Tunnelling Awards!

For the first time, our new Award Organisation Guidelines were applied, with ITA Serbia leading the organisation and the Executive Council, Advisors, and Judges fully engaged.

The response was extraordinary: more than 400 participants, outstanding support from the industry, and almost 30 sponsors backing the ITA Tunnelling Awards, 25 finalists across seven categories — a true showcase of underground excellence from every corner of the globe.

I was deeply impressed by the quality of the projects, the technologies, and above all, the passion and talent of the young tunnellers; every project presented and every candidate was a winner: which is why all finalists received the Brunel trophy or medal, a symbol of lasting recognition.

My warm thanks go to ITA Serbia, Professor Divac and the Organising Committee, as well as to Søren Eskesen and the distinguished judges for their fair and rigorous evaluation.

I also wish to thank the ITA team — ExCo members, Executive Director, Secretariat, and Communications team — whose commitment made this event truly outstanding.

Beyond the trophies, the ITA Tunnelling Awards remind us that underground engineering is about connecting people, uniting nations, and shaping a sustainable future for our planet Earth.

Underground Solutions for a Better World!

ITACET Lunchtime Lecture Series #49 14 October 2025

Join us for the next LLS on October 14!

This instalment of the Lunchtime lecture series will focus on 'Pushing the limits in urban conventional tunnelling' in collaboration with ITA-AITES Working Group 19.

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

- Introduction to the new guideline for the conventional tunnelling in an urban setting – **Etienne Garin**
- Case study – **Vojtech Gall**
- Shotcrete: recent developments – **Robert Galler**

Register here: https://us06web.zoom.us/webinar/register/WN_5CXiAwQETRKUxnXlXFCc1Q#/registration

ITA and IAEA cooperate on underground waste management 15 October 2025

The International Tunnelling and Underground Space Association (ITA) and the International Atomic Energy Agency (IAEA) are working together to support the advancement of Geological Disposal Facilities (GDFs) for radioactive waste.

At a meeting in Vienna on 26 September, senior representatives from both organisations, including Olena Mykolaichuk of the IAEA and Daniel Garbutt, Arnold Dix, Helen Roth, and Andrea Pigorini of the ITA, discussed future collaboration. This builds on recent joint work, notably a forthcoming IAEA publication—developed with significant ITA input—focused on the transition from surface investigations to underground access for GDFs.

To further support the industry, the ITA has launched a special interest group in close cooperation with the IAEA. This group will help member states better understand the technical and safety requirements of GDF development, providing knowledge and support for the safe disposal of radioactive waste.

Andrea Pigorini, President of the ITA, emphasised the importance of the initiative: "*We are committed to contributing our underground expertise to help shape solutions that will protect people and the planet for generations to come*."

The collaboration aims to bridge the gap between safety case requirements and engineering realities, promote best practices, and foster international knowledge exchange. Arnold Dix, ITA Past President, will chair the new initiative.

The ITA and IAEA reaffirm their commitment to supporting the global community in the safe and resilient development of underground solutions for radioactive waste disposal.

Read the full press release here!

INTERNATIONAL GEOSYNTHETICS SOCIETY

www.geosyntheticssociety.org

News

Inaugural IGS Geosynthetics Handbook Launch October 1, 2025

A new geosynthetics reference manual created by the IGS and drafted by some of the industry's top practitioners launched today. The IGS Geosynthetics Handbook is **Read More »**

Beware of Fake Emails and Phishing Scams October 1, 2025

Don't be caught out by fake emails claiming to be from IGS! You may have received an email claiming to be from IGS, asking you **Read More »**

Solmax Success At EuroGeo8 Case Study Contest October 7, 2025

The construction of Germany's first commercial Pit Thermal Energy Storage (PTES) system gave Solmax the win at EuroGeo8's case study contest. The regional Corporate Case **Read More »**

IGS's First Student Club Reveals Inaugural Events October 8, 2025

The Society's first geosynthetics club for university undergraduates has announced an exciting timetable for its launch term. Founded earlier this year, the International Geosynthetics Society **Read More »**

IGS Greece Celebrates 20 Years October 10, 2025

Today marks two decades of the Greek Chapter of the IGS, known as the Hellenic Geosynthetics Society (HGS), after its foundation on October 10, 2005. HGS President **Read More »**

Vision And Collaboration Rewarded In IGS Europe Awards October 14, 2025

Outstanding leadership and dedication to geosynthetics have been recognized in the latest regional IGS Chapter Service Awards. Celebrating the exceptional contribution of IGS members from **Read More »**

China's Young Members Gather For Conference October 15, 2025

China's next generation of geosynthetics professionals shared their latest research at the 3rd Youth Forum of the China Technical Association on Geosynthetics (CTAG). The event **Read More »**

IGS Portugal Wins EuroGeo9 Bid October 23, 2025

UNESCO World Heritage city Porto is to host the next IGS European Conference on Geosynthetics (EuroGeo9) in 2029. A flagship regional conference for the industry, **Read More »**

Could you be the next IGS President? October 27, 2025

Nominations are now open to elect the next IGS President, Vice President and 10 Council Members. Could you be part of the next leadership team **Read More »**

BGA · THE BRITISH · GEOTECHNICAL ASSOCIATION

News
https://www.britishgeotech.org/news

Call for Nominations for the ISRM Rocha Medal 2027 01.10.2025 Read More

The BGA is Headline Sponsor of the Geological Society Fookes Meeting for Engineering Geology 05.10.2025

The meeting will be held at Burlington House in London on 20 and 21 November 2025. It can also be accessed remotely as a virtual event. Read More

Deadline Extended for Entries for the Fleming Award Competition 2025 17.10.2025

Deadline extended to midnight on 24th October 2025. 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. Read More

The November 2025 issue of Ground Engineering is available on line 22.10.2025

The November 2025 issue of Ground Engineering is available on line. Online access to Ground Engineering (GE) is included in BGA subscriptions. Read More

Deadline Extended for Entries for the Fleming Award Competition 2025 24.10.2025

Deadline extended to midnight on 28th October 2025. 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. Read More

BGA Sustainability Training Series

Session 03: Environmental Perspective of Managing End Stage of a Project + Client Handover

Ramboll Manchester Offices, Arkwright House, Parsonage, Manchester M3 2LF [in-person]
Tuesday, 18 November 2025, 17:30 -19:30 BST (GMT)
Please register to access link

Event Information:

- The BGA ECG will be running three sustainability training sessions.
- Each session will consist industry guest speaker presentations, followed by a group activity.
- Each session will be hybrid and held in different cities. It is strongly encouraged to attend all 3 sessions and at least one session in person.

Session 03: Environmental Perspective of Managing End Stage of a Project + Client Handover

This will include:

- A presentation on sustainability and environmental considerations during the handover of the M42 Highways project.
- An interactive activity where teams need to identify challenges one might encounter during the maintenance of environmental requirements (e.g. re-planting!)

Please note, advanced booking is required for this event. Please book using the link below:

Click to Register

ω

G-I GEO-INSTITUTE ASCE

News
www.geoinstitute.org/news

Case Study: The Frank Slide (Frank, AB, 1903)

Created: 09 Oct 2025

Michael Bennett, P.E., M.ASCE (Virginia Tech: Blacksburg, VA)

A case study of the cataclysmic landslide on Turtle Mountain in Frank, Alberta on April 29th, 1903

(το πλήρες κείμενου του άρθρου δίνεται στην ενότητα ΑΡΘΡΑ)

ΔΙΑΚΡΙΣΕΙΣ ΕΛΛΗΝΩΝ ΓΕΩΤΕΧΝΙΚΩΝ ΜΗΧΑΝΙΚΩΝ

Engineering Geology Without Borders: Dr. Paul Marinos and His Canadian Connection

By Nicholas Vlachopoulos

Dr. Paul G. Marinos was a figure whose influence reached far beyond the borders of his native country of Greece. A renowned geologist and engineering geologist, he built a legacy rooted in excellence, mentorship, and international collaboration. Among his many professional relationships, his connection to Canada stands out. It was shaped through shared research, teaching, and a genuine commitment to advancing the fields of and engineering geology and rock mechanics

Dr. Marinos was a professor of engineering geology whose name became synonymous with the development and application of practical geotechnical methods to complex geological problems. His work on hydropower dams in Greece brought him into collaboration with the late Victor Milligan of Golder Associates. Victor Milligan, a Canadian geotechnical luminary whose professional archives are housed at Queen's University in Kingston, Ontario, partnered with Paul Marinos on several major infrastructure projects in Greece. Together, they tackled issues of slope stability, foundation design, and geological risk for some of the country's most ambitious dam and tunnel projects. These projects, often involving flysch and other challenging rock masses, became case studies in how rigorous geology could inform safe, economical engineering design.

Dr. Nicholas Vlachopoulos, Dr. Paul Marinos, Dr. Evert Hoek, Dr. Mark Diederichs and Dr. Giovanni Grasselli at Victor Milligan's celebration of life, 2009.

A pivotal contribution to international rock engineering came from Marinos's work with Dr. Evert Hoek, a giant in Canadian rock mechanics and founder of Rocscience. Together, they refined and expanded the Geological Strength Index (GSI), a system now fundamental in the classification of rock masses for tunnelling and slope design. Dr. Marinos's field experience in Greek rock formations, particularly in highly weathered and heterogeneous materials, gave the GSI depth, nuance, and applicability that resonated with practicing engineers around the world. Their collaboration marked a cornerstone in the development of practical tools for geotechnical engineers. These tools originated, in part, from distinctly Canadian and Hellenic perspectives.

The bridge between Greece and Canada was further reinforced through Dr. Marinos's academic and research collaborations with Dr. Mark Diederichs of Queen's University. These joint efforts included characterization of weak rock masses, field campaigns, and cross-institutional knowledge transfer. The partnership was not only technical, it was also deeply educational. Dr. Marinos was passionate about sharing real-world experience with students. His mentorship extended to Canadian graduate students through technical tours of Greek engineering works, many of which he had been involved in designing. One of those students was myself, and I had the great privilege of learning from him directly both in the classroom and on rugged hillsides overlooking large-scale underground geotechnical works.

My own collaboration with Dr. Marinos deepened further as we co-authored work on the Driskos Tunnel, part of the Egnatia Highway in northern Greece. This project exemplified his ability to seamlessly balance theoretical engineering geology models with the practical requirements of optimized tunnel support. Our joint effort focused on integrating geotechnical risk with constructability, resulting in a tunnel design that responded to the complexities of flysch with innovative support strategies. Working alongside him, Dr Diederichs and Dr. Vassilis Marinos on this publication and project remains one of the most formative professional experiences of my career. His clarity of vision, structured thinking, and deep respect for geology as both a science and a practical tool left an indelible mark on all involved.

Dr. Paul Marinos on-site with Graduate Students from RMC and Queen's Universities.

Dr. Marinos's was also the CGS Cross-Canada Lecturer in 2005. In 2010 he presented at the Kingston CGS Section, deviating northward to Canada as part of his year long US Richard H. Jahns Distinguished Lecturer Tour. His lecture

captivated Canadian students and professionals alike, seamlessly blending theory with practical insight. It was a homecoming of sorts, a moment where his Canadian ties were strengthened and celebrated by the very community he had influenced for decades.

His generosity with time and knowledge, his humility, and his precision left a lasting impression on every student he encountered. He not only taught us how to map, characterize, and classify rock, but also how to observe, think critically, and carry our profession forward with integrity.

Dr. Paul Marinos is no longer with us. He passed away in 2021. However, his legacy lives in the slopes we stabilize, the tunnels we drive, and the generations of engineers he mentored. His connection to Canada, through Victor Milligan, Dr. Evert Hoek, Dr. Mark Diederichs, Queen's University, the Royal Military College of Canada to the CGS and others is a testament to the power of collaboration across borders. For those of us who had the honour of learning from him, he was not only a scholar but a mentor, a guide, and a friend. He is sorely missed…

(άρθρο που δημοσιεύθηκε σε ετήσια έκθεση του IAEG)

ΣΥΛΛΟΓΟΣ ΠΟΛΙΤΙΚΩΝ ΜΗΧΑΝΙΚΩΝ ΑΝΑΤΟΛΙΚΗΣ ΚΡΗΤΗΣ

Διάλεξη Δρ. Πρόδρομου Ψαρρόπουλου

Διασφαλίζοντας Το Μέλλον Του Παρελθόντος: Ο Ρόλος του Μηχανικού σε μια Χώρα με Μεγάλη Ιστορία και σπουδαία Μνημεία

Αποτελεί μεγάλη τιμή για εμένα να είμαι προσκεκλημένος ομιλητής τού Τμήματος Ανατολικής Κρήτης (ΤΑΚ) τού Συλλόγου Πολιτικών Μηχανικών Ελλάδας (ΣΠΜΕ) και τής Προέδρου τού ΣΠΜΕ-ΤΑΚ, κας Ελίνας Μανιαδή.

Ταυτόχρονα, είμαι ιδιαίτερα χαρούμενος που θα με προλογίσει ο εκλεκτός φίλος και στενός συνεργάτης, Γιάννης Τσομπανάκης, Καθηγητής τού Πολυτεχνείου Κρήτης.

Η ομιλία μου θα πραγματοποιηθεί διαδικτυακά τη Δευτέρα, 1η Δεκεμβρίου, στις 19:00, και θα αναφέρεται στον σημαντικό και πολύπλευρο ρόλο των μηχανικών στη διατήρηση τής πολιτιστικής κληρονομιάς τής χώρας μας.

Ο ψηφιακός σύνδεσμος τής εκδήλωσης αναφέρεται στην επισυναπτόμενη αφίσα τού ΣΠΜΕ - ΤΑΚ.

Zoom Meeting Link: Meeting ID: 937 5848 4652, Password: 865704

https://tuc-gr.zoom.us/j/93758484652?pwd=tFdYPr4sFK4Lkk4NAfoko-TLDmC80jh.1

ΘΕΣΕΙΣ
ΓΙΑ ΓΕΩΤΕΧΝΙΚΟΥΣ
ΜΗΧΑΝΙΚΟΥΣ

Tunnelling PhD Opportunity

About Ghent University

Ghent University is a world of its own. Employing more than 15.000 people, it is actively involved in education and research, management and administration, as well as technical and social service provision on a daily basis. It is one of the largest, most exciting employers in the area and offers great career opportunities.

With its 11 faculties and more than 85 departments offering state-of-the-art study programmes grounded in research in a wide range of academic fields, Ghent University is a logical choice for its staff and students.

Your Job

The safe long-term storage of nuclear waste remains an open research question. In the Belgium context underground storage galleries are considered as a solution. To that end, in 2002, a connecting gallery as part of the HADES underground research facility was built. This 90-meter-long gallery features an inner diameter of 4 meters, supported by a concrete segmental lining made up of rings, each comprising 10 segments and two keys. Each ring is 100 cm wide and 40 cm thick. To better understand the behavior of the concrete lining and its interaction with the surrounding Boom Clay, strain gauges were embedded in the concrete segments. These strain gauges have been manually monitored for over 22 years. Monitoring the strain in the concrete lining has proven crucial for estimating the evolution of stresses within the segmental lining and assessing the overall stability of the structure. Additionally, this data facilitates the back-calculation of the external pressure, a crucial factor in understanding long-term soil-structure interactions. Unfortunately, the aging creep behavior of the concrete complicates the analysis and requires advanced multi-physics analysis tool.

The overarching goal of this PhD is to bridge material science and structural performance predictions, including uncertainty quantification. While the project will primarily involve theoretical and numerical investigations, it will also include a limited set of experiments to provide additional insights for refining constitutive laws.

For more information and to apply, please refer to the link below.

Application

ΠΡΟΣΕΧΕΙΣ ΓΕΩΤΕΧΝΙΚΕΣ ΕΚΔΗΛΩΣΕΙΣ

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

6ο Πανελλήνιο Συνέδριο Αντισεισμικής Μηχανικής και Τεχνικής Σεισμολογίας (*6ΠΣΑΜΤΣ*), 30, 31 Οκτωβρίου και 1 Νοεμβρίου 2025, https://6psamts.eltam.org

Med-GU-25 5th Annual Meeting Mediterranean Geosciences Union, 10–13 November 2025 in Athens, Greece, https://2025.medgu.org/index.php

7ο Συνέδριο Αναστηλώσεων, 13-15 Νοεμβρίου 2025, Αθήνα, www.etepam.gr/7o-synedrio-anastiloseon

ORFEUS+EFEHR+EMSC (EPOS Seismology) & Geo-INQUIRE Workshop 2025, 24-27 November 2025, Athens, Greece, https://www.geo-inquire.eu/about/terms-and-conditions, https://docs.google.com/forms/d/e/1FAIpQLSf-LXXy8X-jiEtaCaI_n2VIp7QcM-71TJAY9ZCsPlt8SVNM1Q/viewform

1st International Workshop on Bio-Rock Mechanics, 26-27 November 2025, Okinawa, Japan, https://jiban.skr.u-ryukyu.ac.jp/brm/index.html

17th International Conference on Geotechnical Engineering 8th International Symposium on Geohazards, December 4-5, 2025, Lahore, Pakistan, https://17icge-8isg.com

December 9, 19 & 11, 2025, Your Office
www.mwdconferences.com

The MWD'1 conference aims to unite professionals focused on the latest innovations in geotechnical drilling and measuring while drilling techniques.

To allow for attendance of individuals that cannot travel to The Netherlands, the originally envisioned location for this event, we will now organize it as a virtual event that will showcase the best in research, development, and practical applications. Don't miss the opportunity to be part of this vital dialogue.

The conference MWD2025 has three priority themes:

Theme 1 – MWD to optimize the drilling process

- Improvements and innovations in sensor technology
- Proper selection and installation of monitoring equipment
- Optimal drilling techniques for various geological conditions
- Effects of drilling techniques on monitored parameters
- Support and training for seasoned and new drillers
- Machine learning
- Standardization

Theme 2 –MWD for foundation elements

- MWD assisted deep foundation construction (e.g. drilled shafts, mini-piles, auger cast piles,)
- Monitoring systems and sensors
- QA/QC using MWD
- MWD-based foundation design

Theme 3 – Analysis of MWD

- Data processing and filtering
- Data management (e.g. DIGGS)
- Real-time assessment of drilling parameters for stratigraphic profiling
- Correlations of MWD data to geotechnical properties
- Development or improvement of empirical methods for assessing soil and rock properties
- Innovative use of MWD data

Originally the event was to be held in Giesbeek, a village in the province of Gelderland in the eastern part of The Netherlands near the border with Germany. It is about 9 miles from the Central Station in Arnhem, which has direct train connections with Schiphol Airport (near Amsterdam) and Frankfurt Airport.

Hopefully we can make that happen in 2026, but this year the event will take place in your office.

Contact us

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The Fifth International Conference on Rock Dynamics and Applications (RocDyn-5), 15-17 Jan 2026, Singapore https://rocdyn.com

Advancing Geotechnics for a Resilient and Sustainable Future: Mitigating Multi-hazards amidst Changing Climate

28÷30 January 2026, Taguig City, Philippines
https://seagc2026.pssmge.org

The Philippine Society of Soil Mechanics and Geotechnical Engineers (PSSMGE) and the Southeast Asian Geotechnical Society under the auspices of the Association of Geotechnical Societies in Southeast Asia (AGSSEA) are delighted to welcome you all to the 22nd Southeast Asian Geotechnical Conference from 28th to 30th January 2026 at the Shangri-La the Fort at Bonifacio Global City, Taguig City, Philippines.

A two-day technical program symposium and a half-day technical site visit will be arranged for the conference with the theme **Advancing Geotechnics for a Resilient and Sustainable Future: Mitigating Multi-hazards amidst Changing Climate.** Geotechnical professionals from both the region and other parts of the world will have a special opportunity to connect, exchange ideas, and foster stronger networks and friendships.

Conference Topics

- Geomechanics
- Geotechnical Investigation, Testing and Monitoring
- Excavations and Underground Structures
- Geotechnical Earthquake Engineering
- Geo-environmental Engineering
- Retaining Structures and Earth Structures
- Foundations
- Ground Improvement
- Emerging Topics in Soil Mechanics and Geotechnical Engineering

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2nd International Symposium on Tailings Storage Facilities

March 11 to 13, 2026, Hermosilo, Sonora, Mexico
https://2sisdj-hermosillo-2026.com.mx/en/index.php

The **Mexican Society of Geotechnical Engineering (SMIG)**, in collaboration with its **Technical Committee on Dams and Mining Tailings storage Facilities and the TC221 Tailings and Mine Wastes Technical Committee of the International Society for Soil Mechanics and Geotechnical Engineering**, is pleased to announce the **2nd International Symposium, which will take place in Hermosillo, Sonora, from March 11 to 13, 2026**.

The objective of the Symposium continues to be **promoting the state of the art and best practices in planning, design, construction, operation, and closure of Tailings Storage Facilities**, with special emphasis on risk analysis and management. The technical program will include keynote lectures by internationally recognized specialists, as well as presentations of relevant papers.

Technical Topics

Topic 1: **SITE AND TAILINGS CHARACTERIZATION AND INSTRUMENTATION**

1.1. Site and tailings characterization.
1.2. Geological, geohydrological, and geotechnical studies.
1.3. Seismic characterization and criteria for selecting the design earthquake.
1.4. Geotechnical characterization of Tailings storage facilities (In situ and laboratory).
1.5. Critical topics: determination of peak and residual undrained shear strength.
1.6. Critical topics: characterization to assess liquefaction susceptibility.
1.7. Rheological characterization of Tailings.
1.8. Geochemical characterization.
1.9. Instrumentation and monitoring experience.
1.10. Monitoring of groundwater levels and site aquifers.

Topic 2: **TAILINGS STORAGE FACILITIES**

2.1. Tailings management: conventional (slurry), thickened, paste, and filtered.
2.2. Innovation and technology in Tailings.
2.3. Tailings trade-off studies.
2.4. Tailings management systems.
2.5. Operational considerations for Tailings Storage facilities.
2.6. Operation, maintenance, and surveillance.
2.7. Deposition plans.
2.8. Observational method.
2.9. RTFE and EoR experiences and practices.

Topic 3: **RISK ASSESSMENT AND ANALYSIS**

3.1. Risk assessment and risk management.
3.2. Risk analysis methodologies.
3.3. Environmental and geochemical risks.
3.4. Geological and geotechnical risks.
3.5. Seismic hazard.
3.6. Hydrology and climate change from a risk perspective.
3.7. Analysis of credible failure modes.
3.8. Dam breach analysis.
3.9. Dam Safety Review (DSR) and Dam Safety Inspection (DSI).

3.10. Emergency response plans.

3.11. ALARP risk approach.

Topic 4: **ANALYSIS AND DESIGN OF TAILINGS STORAGE FACILITIES**

4.1. Experience in the design and construction of Tailings Storage facilities.

4.2. Design criteria.

4.3. Geological and geotechnical aspects.

4.4. Seismic aspects.

4.5. Geotechnical analysis and design.

4.6. Water management and water balance.

4.7. Hydrotechnical analysis and design.

4.8. Liner systems, filters, drains, and piping.

4.9. Water management and recovery systems.

4.10. Hydraulic structures (emergency overflow structures and spillways).

4.11. Stability analysis.

4.12. Static and dynamic analysis.

4.13. Numerical modeling of stress-strain and flow liquefaction.

4.14. Performance thresholds and TARP (Trigger Action Response Plans).

4.15. Closure planning and landform design.

Topic 5: **GOVERNANCE AND REGULATORY FRAMEWORK**

5.1. Best practices in governance.

5.2. Global industry standard on Tailings management.

5.3. Regulatory framework.

5.4. Governance structures and roles and responsibilities.

5.5. Environmental aspects and regulations.

5.6. Stakeholder engagement and communication.

Contact

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2nd International Scientific and Practical Conference on Soil Mechanics, Geotechnics and Foundation Engineering
INTELLIGENCE ON GUARD OF MECHANICAL SAFETY
March 17-20, 2026, Moscow, Russia
https://geomos.rssmgfe.ru/en/

The International Scientific and Practical Conference GEOMOS26 is a significant event aimed at developing construction science in Russia. This event will provide a unique platform for the exchange of knowledge and experience, allowing participants to discuss the latest research and achievements in geotechnics. Distinguished specialists in the field of foundation engineering will meet with young researchers at sessions dedicated to the anniversary of the Gersevanov Research Institute.

GEOMOS26 will strengthen the ties between the scientific community and practical specialists. The conference will bring together Russian and foreign scientists, geotechnicians, engineers, designers, examiners, as well as representatives of construction companies and self-regulatory organizations. Their joint efforts will help develop new approaches and solutions that will foster the advancement of the construction industry in Russia and beyond.

Conference themes

- Design and calculation of foundations and shafts
- Deep Foundations
- Soil Property Characterization
- Engineering Geology and Geohazards
- Foundation Engineering for Difficult, Soft, Specific, and Structurally Unstable Soil
- Ground Improvement
- Geotechnical Aspects of Underground Construction
- Foundations of High-Rise and Unique Structures
- Foundation Engineering for Arctic and Cold Regions
- Geotechnics for Climate Change
- Features of Foundation Design for Reconstruction
- Preservation of Historic Sites
- Structural Survey
- Technical Geophysics
- Geotechnical and Field Monitoring
- Scientific and Technical Support in Geotechnical Engineering
- Regulatory Aspects of Geotechnical Engineering

Contact

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t.me/geomoscon

3rd Annual Conference on Foundation Decarbonization and Re-use, March 24-26 2026, Amsterdam, The Netherlands https://foundationreuse.com

3rd Annual Conference on Foundation Decarbonization and Re-use, March 24-26 2026, Amsterdam, The Netherlands, https://foundationreuse.com

PMGEC LEBANON 2026 Pan Mediterranean Geotechnical Engineering Conference, 25 - 28 March 2026, Phoenicia Bei-rut IHG, Lebanon https://pmgec-leb.com

3rd International Conference on Advances in Rock Mechanics (TuniRock 2026), 09-12, 2026, www.tunirock2026.com

International Conference on Geotechnics, Civil Engineering and Structures (CIGOS) 2026 Innovation in Planning, Design

and Civil Infrastructure for Resilient and Sustainable Transformation, April 16 & 17, 2026, Ho Chi Minh City, Vietnam https://cigos2026.sciencesconf.org

LANDSLIDES 2026 Landslide Geo-Education and Risk (LaGER), 27 April - 1 May 2026, Queenstown, New Zealand http://landsliderisk.nz

15th International Conference "Modern Building Materials, Structures and Techniques", May 12-15, 2026, Vilnius, Lithuania, https://vilniustech.lt/332107

ITA-AITES WTC 2026 World Tunnel Congress, May 15 to 21, 2026, in Montreal, Quebec, Canada, https://wtc2026.ca

94th Annual Meeting & International Symposium on Large Dams - Water, Energy and Society: The Evolving Role of Dams in a Changing World, May 21 to 29, 2026, Guadalajara, Mexico, www.icoldmexico2026.com

ICPMG 2026 Physical Modelling in Geotechnics, 8–12 June 2026, ETH Zürich, Switzerland, https://tc104-issmge.com/icpmg-2026

8th International Young Geotechnical Engineers Conference - 8iYGEC, 11. - 14. June 2026, Graz, Austria, www.tugraz.at/institute/ibg/events/8iygec

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

3rd International Geotechnical Innovation Conference - Shaping the World Beneath: Fostering Sustainability, Innovation and Resilience in Geotechnics, 15 - 16 June 2026, Jeddah, Saudi Arabia, https://geotechnicalinnovationconference.com Email info@creativeconnectionevents.com

ICONHIC 2026 International Conference on Natural Hazards & Infrastructure, 29 June – 2 July 2026, Chania, Greece https://iconhic.com/2026

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

Soft Soils 2026 International Conference on Advances and Innovations in Soft Soil Engineering 2026, 24-26 August 2026, Delft, Netherlands https://softsoils2026.dryfta.com

4th International Conference on Geotechnical Engineering

24-26 August 2026, Colombo, Sri Lanka
https://icgecolombo2026.org/

The Sri Lankan Geotechnical Society (SLGS) is delighted to invite geotechnical professionals, researchers, and academics from around the world to ICGE-Colombo 2026, a premier international conference set against the stunning backdrop of Colombo, Sri Lanka. This edition of the conference holds special significance as it coincides with the 40 Anniversary of the Sri Lankan Geotechnical Society, marking four decades of excellence in advancing geotechnical engineering knowledge and practice. A commemorative celebration will be held during the conference to honor this milestone.

Taking place on the 24th and 25th of August 2026, this event serves as a global platform to exchange knowledge, explore innovative research, and discuss emerging trends in geotechnical engineering.

With the theme of *"Resilient Geotechnics for a Sustainable Future"*, ICGE-Colombo 2026 will feature global expertise and cutting-edge research in key areas such as Piled Foundations, Geo-Risk Mitigation and Monitoring, Slope Stabilization, and Transportation Geotechnics. Distinguished international experts will deliver keynote sessions, offering invaluable insights into the latest advancements and challenges in the field. The conference proceedings will be peer-reviewed and published both on the SLGS website and as a printed volume, ensuring lasting contributions to geotechnical knowledge.

Themes

- Geological and Geotechnical Modelling
- Case Histories
- Design for Earthquakes and dynamic loads
- Earth Retaining Structures
- Environmental Geotechnics
- Experimental Investigations
- Foundations
- Sustainable geotechnical practices for Infrastructure Developments
- Sustainable geo Materials for Infrastructure Construction
- Use of AI, robotics, deep learning and machine learning in geotechnical Engineering
- Advances in ground Improvement
- Geotechniques for natural disaster resilience (Landslides, Slope Stability and floods)
- Engineering geology, Rock Engineering and Tunnelling
- Advances in site Investigation and characterization
- Geotechnical risk assessment and management (instrumentation and monitoring)
- Transportation geotechnics
- Energy Geotechnics
- Offshore and harbour geotechnics
- Problematic soils
- Deep excavations
- Geosynthetics

Contact Us

Conference Chairs

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X Latin American Congress on Rock Mechanics 26 - 28 Aug, 2026, Brsasilia, Brazil, https://larms2026.com

3rd International Conference on Construction Resources for Environmentally Sustainable Technologies

Sep 07-08, 2026, Cambridge, England-United Kingdom

https://engage-events.ifm.eng.cam.ac.uk/IC-CREST2026#/

The 3rd International Conference on Construction Resources for Environmentally Sustainable Technologies, CREST 2026, will be held at Churchill College, Cambridge, UK on 7 - 8 September 2026 following successful conferences in 2023 and 2021.

CREST 2026 evolved from a collaboration between University of Cambridge and Kyushu University with the aim of addressing issues related to natural and man-made disasters and the impacts of climate change. This will include solutions to these disasters through the use of alternative resources, disruptive technologies and disaster mitigation measures which will allow the building of a sustainable and resilient society using geo-engineering.

The themes of CREST 2026 cover a broad range of interdisciplinary areas to enhance disaster preparedness and to "Build Back Better". This includes integrating disaster risk reduction into development measures, thereby making nations and communities more resilient to future disasters.

Themes & Topics

1. Geo-Engineering for Hazard Mitigation

- Climate change related natural disasters
- Climate change independent natural disasters
- Disasters associated with anthropogenic activities
- Economic aspects of disaster risk assessment and modelling

2. Geo-Engineering for Climate Change Adaptation

- Geo-Engineering for Renewable Energy Systems
- Innovative techniques for reducing the Carbon footprint of geoengineering Innovative case studies of sustainable design and construction
- Socio–economic and environmental aspects of sustainable construction

3. Disruptive Technologies for sustainable Geotechnical Engineering

- Information based (AI, IoT, VR, etc.) measures for natural disaster mitigation
- Application of DX and i-Construction
- Physical and numerical modelling of disasters and disaster mitigation techniques
- Smart energy harvesting techniques

4. Low carbon materials in Geoengineering

- Advancements in low cost and low carbon construction techniques
- Recycled materials (alternative geomaterials) in geotechnical constructions
- Mechanical and constitutive properties of recycled materials
- Management and utilization of disaster wastes

Get in touch: **ifm-events@eng.cam.ac.uk**

13 ICG - 13th International Conference on Geosynthetics (13 ICG), 13-17 September 2026, Montréal, Canada, www.13icg-montreal.org

Eurock 2026 Risk Management in Rock Engineering - an ISRM Regional Symposium, 15-19 September 2026, Skopje, Republic North Macedonia, https://eurock2026.com

ECEE2026 18th European Conference on Earthquake Engineering Shaping the Future of Earthquake Engineering, 14 – 1 September 2026, Berlin, Germany, https://ecee2026.eu

ISRM Regional Symposium – EU-ROCK 2026, September 15–19, 2026, in Skopje, N. Macedonia, https://eurock2026.com

International Symposium Preservation of Monuments & Historic Sites, 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, Graz, Austria, www.icitg2026.com

EWRWSE – 2026 7th International Conference on Environmental Geotechnology, Recycled Waste Materials and Sustainable Engineering, 22-25 October 2026, Surat, Gujarat, India www.egrwse2026.com

SLOPE STABILITY 2026 Slope for Safety Performance an ISRM Specialized Conference, 26 – 29 October 2026, Lima, Peru www.slopestability2026.com/en

PBD-V Chile International Conference on Performance-Based Design in Earthquake Geotechnical Engineering, November 4th to 6th, 2026, Puerto Varas, Chile www.pbd-v-chile.com

ARMS 14 Fukuoka 2026 - 14th Asian Rock Mechanics Symposium Rock Mechanics for the Next Generation –Innovations, Sustainability, and Resilience – an ISRM Regional Symposium, 22-26 November 2026, Fukuoka, Japan, www.ec-convention.com/ARMS14/

The 6th International Conference on Geotechnics for Sustainable Infrastructure Development
November 26 - 27, 2026, Hanoi, Vietnam
https://geotechn.vn/

The International Conference on Geotechnics for Sustainable Infrastructure Development (GEOTEC HANOI or GH in short) has established itself as a premier event in Vietnam and the broader region, renowned for its academic excellence, organizational scale, and high-quality contents. Since its inception in 2011, the conference has been successfully held in Hanoi in 2011, 2013, 2016, 2019, and 2023. Each event has served as a global forum for scholars, researchers, and professional engineers to exchange the latest advancements and technologies in geotechnical engineering. The 5th conference in 2023 welcomed over 1,200 participants from 40 countries across five continents. A hallmark of every GEOTEC HANOI conference is its lineup of outstanding keynote lectures delivered by world-leading experts. Highlights of the past events can be viewed at https://geotechn.vn/geotec-hanoi-about. The conference also offers exceptional opportunities for sponsors and exhibitors to connect with the professional community and showcase their innovations and services.

Looking ahead, the 6th conference, GEOTEC HANOI 2026, will be held in November 26-27, 2026 at the National Convention Center (NCC) in Hanoi, Vietnam. It is co-organized by FECON Corporation, the Vietnam Society for Soil Mechanics and Geotechnical Engineering (VSSMGE), and the Chinese Institution of Soil Mechanics and Geotechnical Engineering (CISMGE), with the honorable patronage and support of the International Society for Soil Mechanics and Geotechnical Engineering (ISSMGE).

Building on its strong legacy, GEOTEC HANOI 2026 promises to be another landmark event, bringing together high-profile academics, researchers, and industry professionals from around the world. The conference will feature six traditional themes, i.e., Deep Foundations, Tunneling and Underground Spaces, Ground Improvement, Landslide and Erosion, Geotechnical Modelling and Smart Monitoring, Offshore Wind Power and Coastal Geotechnics, and especially two emerging and highly relevant themes: Applications of Artificial Intelligence (AI) in Geotechnical Engineering and Geotechnics for High-speed Railways.

Conference Themes

1. Deep Foundations
2. Tunnelling and Underground Spaces
3. Ground Improvement
4. Landslide and Erosion
5. Offshore Wind Power and Coastal Geotechnics
6. Geotechnical Modelling and Smart Monitoring
7. AI in Geotechnical Engineering
8. Geotechnics for High-speed Railways

Supporting

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March 17 - 19, 2027 | Florence, Italy
https://dfi-events.org/grout27/index.html

Deep Foundations Institute (DFI) and International Conference Organization for Grouting (ICOG) with support from Geo-Institute's Grouting Committee present the 7th International Conference on Grouting and Deep Mixing. Stay up to date on the latest grouting practices, network with industry professionals, view the latest technology and services in the Exhibit Hall. This event covers all types of grouting for foundation projects. Keynote lectures, technical paper presentations, and panel discussions will present and debate advances in methods, materials, instrumentation, and control; highlighting their use and understanding for a variety of applications, #GROUT27.

DFI and ICOG, together with Conference Co-Chairs Kathleen Bensko, P.G. (KBensko Consulting) and Paolo Gazzarrini, FEC, P.Eng. (Sea to Sky Geotech), Program Co-Chairs Raffaella Granata (TREVI Group) and Allen Cadden, P.E., BC.GE (Schnabel Engineering), invite you to submit an abstract for this three-day event, which is also supported by ASCE's Geo-Institute Grouting Committee and a global Technical Advisory Committee.

Presentation Topics

- **Advances in Data Management**: project and data management systems leveraging big data and AI
- **Innovations and Developments in Drilling, Grouting and Deep Mixing**: permeation, compaction, compensation and jet grouting; deep mixing; other cutoff methods; equipment and methods for drilling/mixing/ pumping
- **Advances in Grout Materials**: bio cement, various types of cement, microfine/ultrafine cement, sodium silicate, nanosilica, hot melts, foams, polyurethanes, acrylates, admixtures
- **Properties of Grouted Material**: grouted soils and rock, compaction grouted soils, soil-cement produced by deep mixing and jet grouting, strength and permeability of grouted soils
- **Grouting and Sustainability**: materials, drilling, grouting and deep mixing as alternatives to less sustainable solutions; environmental mitigation
- **Codes, Standards and Specifications**: owners/contractors/suppliers/ third-party perspectives, international variation, challenges and lessons learned
- **Advances in Verification and Monitoring**: geophysical methods, field tests, innovation, measurement while drilling, sampling and testing techniques, automation and digital controls, real-time monitoring and control
- **Case Studies in Applications**: dams, levees, mines, tunnels, seismic retrofit and remediation; ground treatment (permeability reduction, settlement control, structural support), grouting for major infrastructure; environmental applications; grouting for deep foundations, anchors and micropiles; other seepage cutoff
- **Grouting for Resiliency**: harbors, waterfronts, dams and levees; extreme event mitigation; emergency response and restoration Important Dates

April 12 to 14, 2027, Lyon, France
www.menard-group.com/isgi-lyon2027

We are pleased to welcome you to the TC211 **symposium**, taking place at the **Cité Internationale – Centre de Congrès de Lyon, France**, from **April 12 to 14, 2027**.

This international symposium will gather researchers, engineers, and professionals to exchange knowledge and explore innovations in ground improvement.

The event is **co-organized with the CFMS** (French National Society for Soil Mechanics and Geotechnical Engineering).

ITA World Tunnel Congress 2027 - Antwerp (WTC 2027)
Underground Creativity to Meet Societal Needs
23-29 April 2027, Antwerp, Belgium

The World Tunnel Congress 2027, scheduled to take place in Antwerp from the 23rd to the 29th of April 2027, is a leading event in the field of tunnel construction, underground building, and technology. Professionals from around the world gather to exchange knowledge, present innovations, and discuss the future of the tunnel industry. The event attracts experts, researchers, policymakers, and companies from various sectors, including civil engineering, construction, transportation, and infrastructure.

International Symposium
Cone Penetration Testing CPT '27
May 12 - 14 2027, Vancouver, Canada
www.cpt27.org

CPT'27, an International Symposium on Cone Penetration Testing will be held in Vancouver, Canada in 2027. Organized under the auspices of ISSMGE TC102, we hope to bring together industry leaders in industry, practice and research to share their knowledge and experience in cone testing across the globe.

Danube-European Conference on Geotechnical Engineering
9–12 June 2027, Budapest, Hungary
https://18decge.hu/

The Danube-European Conference on Geotechnical Engineering (DECGE) was conceived in 1963, shortly after the passing of Prof. Karl Terzaghi. In 1964, the Austrian Society of Engineers and Architects (ÖIAV) took the initiative to bring together geotechnical experts from both East and West, despite the barrier of the "Iron Curtain".

The Danube region has long faced numerous challenges, including flood protection, riverbank stability, groundwater management in the hinterlands, hydropower development, and ecological restoration. Today, these challenges are compounded by the impacts of climate change and the urgent need to safeguard one of Europe's most sensitive ecosystems.

Reflecting these realities, the XVIII DECGE will be dedicated to "Geotechnical Engineering for Resilience and Sustainability." The conference will address both long-standing issues and emerging priorities, extending the discussion beyond classical geotechnical topics to the pressing challenges of our time.

Conference themes

- Geotechnical characterization and modelling

- Eurocode 2nd generation: design methodologies
- Sustainable geotechnologies and materials
- Urban and transportation geotechnical resilience
- Sustainable renovation methods
- Environmental geotechnics and climate adaptation
- Geohazard, risk, monitoring and mitigation
- Digital transformation and data-driven geotechnics

11th European Conference on Numerical Methods in Geotechnical Engineering
21 – 24 September 2027, Graz, Austria
www.tugraz.at/events/numge2027/home

The **11th European Conference on Numerical Methods in Geotechnical Engineering (NUMGE 2027)** will take place in **Graz, Austria, from 21st - 24th of September 2027**.

Organized by **ERTC7 (European Regional Technical Committee 7 for Numerical Methods)** under the auspices of the **International Society for Soil Mechanics and Geotechnical Engineering (ISSMGE)**, NUMGE has been a key conference series since its inception in **1986 (Stuttgart, Germany)**. Over the years, it has been hosted in various European cities, including Santander (1990), Manchester (1994), Udine (1998), Paris (2002), Graz (2006), Trondheim (2010), Delft (2014), Porto (2018), and most recently, London (2023).

NUMGE 2027 will serve as a vital platform for academics, researchers, and engineering professionals to exchange insights on the **latest advancements and challenges** in numerical methods applied to geotechnical engineering. The conference will foster discussions on **cutting-edge developments**, practical applications, and future directions in this rapidly evolving field.

Conference topics

- Constitutive modeling for saturated and unsaturated soils
- Numerical methods: finite element, finite difference, discrete element, material point, and others
- Coupled analysis techniques
- Geotechnical earthquake engineering
- Probabilistic approaches and inverse analysis
- Applications of machine learning and artificial intelligence
- Design and analysis of dams, embankments, and slopes
- Excavations and retaining structures
- Shallow and deep foundation systems
- Tunneling and mining applications
- Soil reinforcement and ground improvement techniques
- Offshore geotechnical engineering
- Geo-energy and energy geotechnics
- Regulations, standards, and design codes
- Interpretation of geotechnical data and model parameter identification
- Uncertainty quantification and reliability assessment

Organization

The 11th NUMGE will be organized by the Institute of Soil Mechanics, Foundation Engineering and Computational Geotechnics from Graz University of Technology under the auspices of the ISSMGE ERTC7 – Numerical Methods.

Organizing Committee

Franz Tschuchnigg (Chair)
Johannes Leo
Haris Felić

Institute of Soil Mechanics, Foundation Engineering and Computational Geotechnics
numge2027@tugraz.at

16th International Congress on Rock Mechanics Innovations in Rock Mechanics and Rock Engineering for a Sustainable Future, 17-23 October 2027, Seoul, Korea, https://isrm2027.com

Eurock2028 -
Advances in rock mechanics and rock engineering to cope with increasingly extreme conditions - an ISRM Regional Symposium
25 - 30 Jun, 2028, Aix-en-Provence, France

"Connecting Continents Through Geotechnical Innovations"
04-08 September 2028, Istanbul, Turkey
https://zmgm.org.tr/en

Conference Topics

01 Modelling and Experimental Assessment of Geomaterials
02 Geohazards, Earthquakes and Risk Mitigation
03 Development of Resilient and Sustainable Geosystems
04 Geotechnical Construction and Soil Improvement

05 Geotechnical Engineering of Multiscale Observations, Sensors and Monitoring

06 Energy Geotechnologies

07 Technological Innovation

08 Geo Education, Standards And Codes

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ΕΝΔΙΑΦΕΡΟΝΤΑ ΓΕΩΤΕΧΝΙΚΑ ΝΕΑ

Iran among 'world's most extreme subsidence hotspots' with some areas sinking up to 1 foot per year, study finds

The extraction of water from aquifers in Iran is causing an area the size of Maryland to sink, exposing an estimated 650,000 people to the risks of subsidence and freshwater depletion.

Cities like Tehran will be directly impacted by the severe subsidence recorded across Iran. (Image credit: BornaMir /Getty Images)

The depletion of Iran's underwater aquifers is driving the ground to sink rapidly throughout the country, new research shows.

More than 12,120 square miles (31,400 square kilometers) of the country — an area roughly the size of Maryland — is now moving downward faster than 0.39 inches (10 millimeters) per year. In a more extreme example, the ground level has dropped by over a foot (34 cm) per year near the city of Rafsanjan, in central Iran.

This sinking, known as subsidence, exposes an estimated 650,000 people to a higher risk of other threats caused by changes in ground level, such as water scarcity and food insecurity, experts say. And part of the cause is ongoing drought in the country.

Measuring the subsidence

In Iran, about 60% of the water supply comes from underground aquifers. To study what effects this is having on the surface, Jessica Payne, a doctoral candidate in the School of Earth and Environment at the University of Leeds in the U.K., and her colleagues used radar data from the European Space Agency's Sentinel-1 satellite constellation to map how the ground level in Iran has changed over eight years between 2014 and 2022.

The researchers found 106 regions of subsidence covering a total of 12,120 square miles, or about 2% of the country.

"The rates of subsidence in Iran are some of the fastest in the world," Payne told Live Science. "We found about 100 sites across Iran where subsidence is faster than about 10 millimeters [0.4 inches) a year. In Europe, case studies are considered extreme if they exceed 5 to 8 millimeters [0.2 to 0.3 inches] a year."

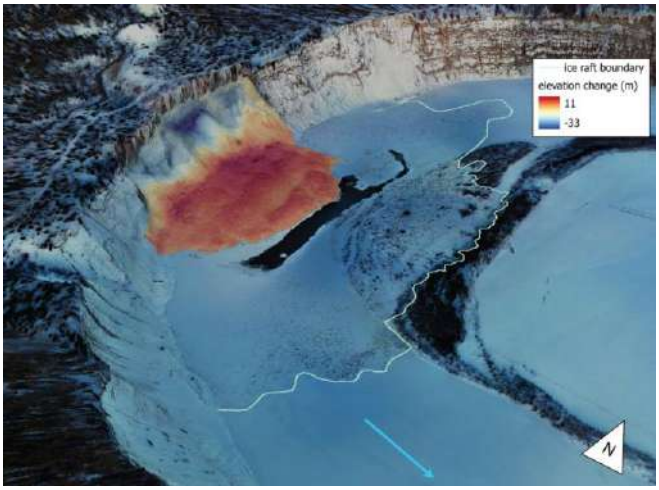
The ground is sinking due to groundwater extraction, she said, with 77% of incidences of subsidence faster than 10 mm per year correlating with the presence of agriculture.

(Chris Simms / LIVESCIENCE, 2 October 2025, https://www.livescience.com/planet-earth/iran-among-worlds-most-extreme-subsidence-hotspots-with-some-areas-sinking-up-to-1-foot-per-year-study-finds)

The 17 December 2024 Takhini River landslide and river-ice tsunami, Whitehorse, Yukon, Canada

A major slope collapse in frozen sediments in Canada highlights the role of progressive failure.

Back in January of this year, I posted fascinating a piece by Derek Cronmiller of the Yukon Geological Survey about the 17 December 2024 Takhini River landslide and river-ice tsunami, which occurred in Whitehorse, Yukon, Canada. The location of this landslide is at [60.8611, -135.4180]. As a reminder, this is a figure from his post showing the landslide:-



Surface elevation change detection comparing 2013 lidar DTM to a 2025 DSM created from UAV photos for the Takhini River landslide.

Derek has now published a more detailed article in the journal *Landslides* (Cronmiller 2025) that provides the definitive description of this event. One element of the article caught my attention. The piece examines in some detail the initiation of the landslide. Cronmiller (2025) observes that:-

"In the case of the 17 December 2024 Takhini landslide, all common triggers are conspicuously absent, and the timing appears to be random."

The article concludes (rightly in all probability) that the initiating mechanism was progressive failure – i.e. that the slope underwent brittle failure through a tertiary creep mechanism. Under these circumstances no external trigger is needed.

As such, Cronmiller (2025) is much more than a simple (although fascinating) case study. As Derek writes:

"While progressive failure mechanisms are commonly discussed in rockslide and gravitational slope deformation literature, their role in producing landslides in surficial sediments

is discussed relatively infrequently as acute triggers commonly mask the effect of this phenomenon's contribution to slope failure. This case study provides an important example to show that acute triggers are unnecessary to produce landslides in dry brittle surficial sediments."

I wholeheartedly agree.

Reference

Cronmiller, D. 2025 The 17 December 2024 Takhini River landslide and river-ice tsunami, Whitehorse, Yukon, Canada. *Landslides*. https://doi.org/10.1007/s10346-025-02622-8

(Dave Petley / EOS The Landslide Blog, 8 October 2025, https://eos.org/thelandslideblog/takhini-river-landslide-2)

The 17 december 2024 Takhini River landslide and river-ice tsunami, Whitehorse, Yukon, Canada

Derek Cronmiller

Abstract

On 17 December 2024, a 118,000-m^3 landslide on a cut bank of the Takhini River, Yukon, broke through the river-ice and generated a tsunami. The tsunami transported blocks of river-ice up to 250 m from the landslide deposit and destroyed vegetation on the opposite riverbank splintering and uprooting trees more than 20 cm in diameter. River-ice blocks in the tsunami deposit commonly exceed 4 m^2 and 30-cm thickness. Snapped branches and impact scars on the trunks of four surviving trees in the tsunami impact area record damage from rafted ice up to 2.5-m height. The landslide-generated tsunami increased the hazard-affected area by 260% from 2.8 ha to 7.2 ha. The ice cover on the river effectively concentrated the tsunami hazard by reducing its overall footprint while increasing the damage in affected areas through entrainment of ice blocks; this effect is an important consideration for future landslide and tsunami hazard assessments in cold regions. Residual hazard at the site includes additional landslides from the landslide scar and altered river dynamics due to obstruction by the landslide deposit. Erosion rates of a previous smaller landslide suggest that the obstruction in the river is likely to remain for at least a decade. The lack of conspicuous triggers for this landslide points to the importance of progressive failure processes in a dry brittle soil slope over-steepened by fluvial erosion.

Cronmiller, D. The 17 december 2024 Takhini River landslide and river-ice tsunami, Whitehorse, Yukon, Canada. *Landslides* (2025). https://doi.org/10.1007/s10346-025-02622-8

ΕΝΔΙΑΦΕΡΟΝΤΑ - ΓΕΩΛΟΓΙΑ

Stalagmites adhere to a single mathematical rule, scientists discover

Scientists discover all stalagmites growing from cave floors follow a mathematical rule that explains how these mineral formations develop into different shapes.

Researchers studied stalagmites in the Postojna Cave in Slovenia. (Image credit: I love taking photos and I think that is a really great opportunity for me to share them/Getty Images)

Stalagmites all adhere to a mathematical rule, scientists have discovered after creating equations showing how the dramatic mineral formations develop into different shapes.

The new mathematical descriptions could help scientists extract more accurate data about past climate conditions, the researchers noted in a study to be published the week of Oct. 13 in the journal PNAS.

"It turns out that the rich diversity of stalagmite shapes can be explained by one simple parameter," study co-author Piotr Szymczak, a physicist at the University of Warsaw, said in a statement. "This is a rare case where the beauty we see in nature corresponds directly to a clean mathematical law."

Stalagmites can grow up to hundreds of feet tall from cave floors and take many different shapes — from sharp, narrow cones to wide, flat-topped mounds. They're created when mineral-rich water drips from the ceiling of a cave onto roughly the same spot for thousands of years, where it steadily deposits calcite in a tower growing from the cave floor.

In the new study, Szymczak and his colleagues developed a set of mathematical equations that describes how all of these shapes come to be. They found that the shape a stalagmite eventually adopts is controlled by the rate at which water drips from the cave's ceiling onto the stalagmite, and how quickly the calcite in that water gets left behind. These can be represented by a single value called the Damköhler number.

Fast-flowing water dripping from a cave ceiling tends to create pointy, cone-shaped stalagmites, while water that drips more slowly onto the same spot forms thicker, column-like stalagmites. When the water drips down from a great height, or doesn't drip in exactly the same place, wide stalagmites with flat tops can form.

The scientists then validated their equations by comparing the expected shapes of stalagmites under different conditions to actual stalagmites taken from Postojna Cave in Slovenia.

"When we compared our analytic solutions with real cave samples, the match was remarkable," study co-author Matej Lipar, a physical geographer at the Research Centre of the Slovenian Academy of Sciences and Arts, said in the statement. "It shows that even under natural, messy conditions, the underlying geometry is there."

Scientists could use this geometry to get more accurate data about past climate from the formations, the authors wrote in the study. Much like tree rings, stalagmites grow in layers, recording information about rainfall and temperature over time. Scientists use the ratios of different forms, or isotopes, of carbon in each layer to extract that information. The stalagmites' shape affects how those layers are deposited, which could in turn affect how scientists interpret the conditions under which they grew.

"Stalagmites are natural climate archives, but we now see that their geometry leaves its own imprint on the isotopic record," study co-author Anthony Ladd, a chemical engineer at the University of Florida, said in the statement. "Recognizing this effect will allow us to extract more reliable information about past climates."

(Skyler Ware / LIVESCIENCE, 16 Oct. 2025, https://www.livescience.com/planet-earth/geology/stalagmites-adhere-to-a-single-mathematical-rule-scientists-discover)

ΕΝΔΙΑΦΕΡΟΝΤΑ - ΛΟΙΠΑ

The oldest human-made structure ever discovered may be three times older than the Pyramid of Khufu, at least 23,000 years old Theopetra cave

Deep beneath the limestone cliffs of Thessaly, Greece, archaeologists have uncovered evidence that rewrites our understanding of human construction history. The Theopetra cave, nestled just three kilometers from the famous Meteora monasteries, houses what researchers believe to be **humanity's oldest known artificial structure** – a stone wall dating back approximately 23,000 years, making it nearly three times older than Egypt's Great Pyramid of Kheops.

Archaeological marvel hidden in plain sight for millennia

The Theopetra cave system formed during the Cretaceous period, between 137 and 65 million years ago. However, human occupation began much later, around 130,000 years ago during the Middle Paleolithic era. *Neanderthal populations* likely first established themselves within these protective limestone chambers, beginning an extraordinary timeline of continuous habitation.

Dr. Catherine Kyparissi-Apostolika initiated systematic excavations in 1987, revealing layers of human activity spanning from the Paleolithic through the Neolithic periods until approximately 3,000 BCE. The archaeological team discovered an impressive array of artifacts including stone tools, shell jewelry, fire traces, burial sites, and remarkably preserved children's footprints. These findings demonstrate the cave's crucial role as a **prehistoric sanctuary** for successive human populations.

The site's geological formations have provided exceptional preservation conditions, allowing researchers to study continuous human adaptation across multiple climatic periods. Modern scientists continue making groundbreaking discoveries in various locations, much like recent findings where more than 1,500 feet beneath the ice of Antarctica, scientists made an astounding discovery, proving that extreme environments often preserve remarkable evidence of life.

Engineering brilliance during the last ice age

The ancient wall represents a **revolutionary architectural achievement** constructed approximately 21,000 BCE during one of Earth's most challenging climatic periods. Built using carefully selected stones bound with clay mortar, this structure blocked two-thirds of the cave's entrance, reducing the opening to roughly one meter in width.

Archaeological analysis suggests this construction served as *critical climate protection* against the extreme cold that characterized the last glacial maximum. The wall's strategic positioning demonstrates sophisticated understanding of thermal dynamics and airflow control, marking a pivotal moment in human architectural evolution.

Ancient Structure	Location	Construction Date	Primary Function
Theopetra Wall	Greece	21,000 BCE	Climate protection
Çatalhöyük	Turkey	7,400 BCE	Urban settlement
Cairn de Barnenez	France	4,800 BCE	Funerary monument
Stonehenge	England	3,000 BCE	Ceremonial site

The engineering techniques employed reveal remarkable problem-solving capabilities among prehistoric populations. These ancient builders understood material properties, structural stability, and environmental adaptation long before formal architectural principles emerged. Their innovative approach to **survival architecture** influenced subsequent construction methods throughout human history.

Treasure trove of prehistoric human evolution

Theopetra's archaeological layers provide unprecedented insights into human transitional periods across prehistoric eras. Successive occupation levels contain tools from Paleolithic, Mesolithic, and Neolithic periods, alongside bone implements, shell artifacts, and early pottery fragments. The site serves as a comprehensive *prehistoric timeline* documenting human technological advancement.

Burial discoveries dating between 15,000 and 7,000 years ago reveal sophisticated funerary practices among small human groups. Archaeological evidence indicates these inhabitants maintained diverse diets including wheat, barley, olives, and various meat sources, suggesting advanced agricultural knowledge and hunting techniques.

Research indicates that cave occupation experienced periodic interruptions corresponding to major climatic shifts throughout prehistory. During intense cold periods, inhabitants adapted their living strategies, with the wall construction representing their most significant architectural response. Later periods saw the cave utilized as **wartime shelter** and livestock enclosure, demonstrating its enduring importance to local populations.

Just as ancient civilizations demonstrated remarkable foresight, modern scientific predictions continue shaping our understanding of human development. Interestingly, thirty years ago, Stephen Hawking made predictions for 2025 that showcase humanity's continued capacity for long-term thinking and innovation.

Legacy of humanity's earliest architects

Contemporary preservation efforts have closed Theopetra cave to public access, protecting this fragile archaeological treasure for future generations. Ongoing excavations continue revealing new information about early European populations, their burial customs, dietary practices, and techno-

logical innovations. The site remains **actively researched** by international archaeological teams.

The Theopetra wall predates famous monuments like Egypt's pyramids and England's Stonehenge by thousands of years, fundamentally challenging traditional narratives about human architectural capabilities. This discovery demonstrates that *human ingenuity* manifested long before the emergence of recognized ancient civilizations.

Modern archaeological discoveries continue expanding our understanding of ancient human achievements. Recent findings include significant resource discoveries, such as cases where geologists have discovered the largest gold, silver, and copper deposit, reminding us that Earth continues yielding secrets about human history and natural resources.

The Theopetra cave wall stands as testimony to human adaptability, creativity, and survival instinct during Earth's most challenging prehistoric periods. This **23,000-year-old construction** represents not merely humanity's oldest known building, but evidence of our species' enduring capacity to modify environments for survival and prosperity.

(Dr. Rosalia Neve / evidence network.ca, 7 October 2025, https://evidencenetwork.ca/the-oldest-human-made-structure-ever-discovered-may-be-three-times-older-than-the-pyramid-of-khufu-at-least-23000-years-old)

ΗΛΕΚΤΡΟΝΙΚΑ ΠΕΡΙΟΔΙΚΑ

International Society for Soil Mechanics and Geotechnical Engineering

ISSMGE Bulletin, Vol 19, Issue 3, September 2025

https://www.issmge.org/publications/issmge-bulletin/vol-19-issue-3-september-2025

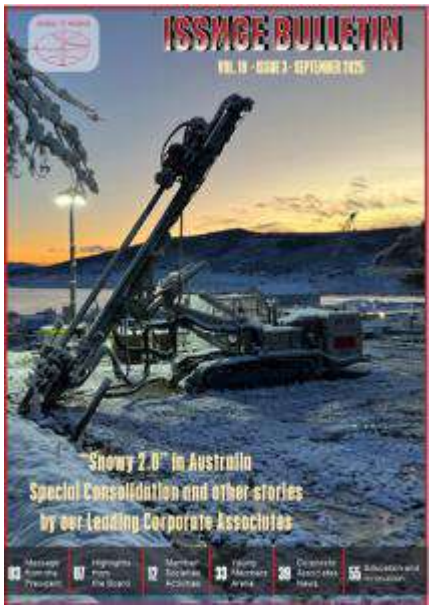


Table of Contents

https://issmge-e.eu/autumn-2025

A movement, not just an election!

Dear colleagues,

Over the past months, I have been deeply moved by the many messages of encouragement and trust I have received from across our community. After thoughtful reflection and many conversations with friends and colleagues around the world, I have decided to accept the honour of standing as a candidate for the Presidency of the International Society for Soil Mechanics and Geotechnical Engineering (ISSMGE) for the 2026–2030 term.

I would like to express my heartfelt thanks to the societies that have formally co-nominated me for this position: the Czech and Slovak Society for Soil Mechanics and Geotechnical Engineering, the Hungarian Geotechnical Society, the Italian Geotechnical Society, the Polish Committee on Geotechnics, the Portuguese Geotechnical Society, the Romanian Society for Geotechnical and Foundation Engineering, the Spanish Society for Soil Mechanics and Geotechnical Engineering, Swiss Geotechnical Society and the Turkish National Society for Soil Mechanics and Geotechnical Engineering.

I am humbled by their confidence and encouraged by the many other societies that have since reached out to express their support. This collective trust has strengthened my determination to dedicate myself fully to advancing our Society's mission and values.

This decision reflects my deep belief in ISSMGE as a global family that unites scientific excellence, practical experience, and a shared commitment to building a more resilient and sustainable world.

As we look ahead to the 21st ICSMGE in Vienna, I look forward to continuing our collaboration and to shaping the next chapter of ISSMGE together.

With sincere appreciation,
Prof. Lyesse Laloui
Vice-President for Europe, ISSMGE

ISSMGE EUROPE NEWS

29TH EUROPEAN YOUNG GEOTECHNICAL ENGINEERS CONFERENCE (EYGEC 2025) – RIJEKA, CROATIA

Young talents gather in Rijeka to advance the future of geotechnics

The **29th EYGEC** was successfully held from **9–12 September 2025** in Rijeka, Croatia, hosted by the **Croatian Geotechnical Society** and the **Faculty of Civil Engineering, University of Rijeka**, under the auspices of ISSMGE. The conference once again confirmed its reputation as a vital platform for young engineers to exchange ideas, present research, and build international networks.

Highlights of the event:

- **50 young engineers from 24 European countries** participated.
- **48 peer-reviewed papers** were presented, spanning topics such as numerical analysis, deep excavations, soil dynamics, laboratory testing, bio-based soil improvement, slope stability, and field monitoring.
- The scientific programme included **one plenary lecture and six invited lectures** delivered by leading experts.
- Proceedings were published as an **open-access volume** by the Croatian Geotechnical Society.
- The conference opened with welcoming addresses from **Prof. Lyesse Laloui (ISSMGE Vice President for Europe)**, **Assoc. Prof. Leo Matešić (President, Croatian Geotechnical Society)**, and **Assoc. Prof. Martina Vivoda Prodan (Conference Chair)**.
- A rich **social programme in Rijeka** complemented the scientific sessions, offering participants opportunities to connect and enjoy the Adriatic city's cultural heritage.
- The success of the event is thanks to the **dedication of the organising committee, led by Assoc. Prof. Vivoda Prodan**, and the generous support of sponsors and volunteers.

"It was a true honour to welcome so many talented young Geotechnical engineers to Rijeka. The quality of their contributions and the spirit of collaboration throughout the event give us confidence in the future of our profession." – **Assoc. Prof. Martina Vivoda Prodan, Conference Chair**

Looking ahead, the community is already preparing for the **30th EYGEC**, which will be hosted in **Sofia, Bulgaria, in 2027** ensuring the continuation of this proud tradition of fostering Europe's next generation of Geotechnical leaders.

Photos of the event are available on the official EYGEC 2025 gallery.

THE ROMANIAN-GREEK SEMINARS

An example of bilateral cooperation between ISSMGE European member societies to the benefit of both nations' geotechnical communities.

Following close cooperation between the Romanian Society for Soil Mechanics and Foundation Engineering (SRGF) and the Hellenic Society for Soil Mechanics and Geotechnical Engineering (HSSMGE) since 2022, the two societies have already organized the **1st Romanian-Greek Seminar on Earthquakes and Geotechnical Engineering** on **March 27th 2025 in Bucharest, Romania**, and are currently organizing the **2nd Greek-Romanian Seminar on Earthquakes and Geotechnical Engineering "Lessons learned from Earthquakes and Geotechnical Failures" on October 9th 2025 in Thessaloniki, Greece.**

These seminars acknowledge the cooperation between the respective professional societies and try to create a platform sharing expertise and

Loretta Batali, President, SRGF

fostering collaboration between the geotechnical and earthquake communities of Romania and Greece. With both Romania and Greece located in seismically active regions and facing multiple geotechnical problems, each country with its specificity, these seminars offer the opportunity to discuss the latest developments and challenges in earthquake and geotechnical engineering.

Michael Bardanis, President, HSSMGE

The 1st seminar focused especially on the 2nd generation of Eurocodes 7 and 8. The upcoming 2nd seminar will look through the even more challenging lense of geotechnical and earthquake-related failures.

The 1st seminar included 9 speakers covering both earthquake and geotechnical engineering issues, was attended by 120 delegates from Romania, Greece and some other countries and attracted several sponsors from Romania. All lectures were recorded and uploaded on the YouTube channels of Universitatea Tehnică de Construcții București which was the host of the 1st Seminar and HSSMGE having already thousands of views from around the world.

The 2nd seminar will include 8 speakers covering again both earthquake and geotechnical engineering issues and will conclude with a discussion panel hosting George Gazetas, Kyriazis Pitilakis, Loretta Batali and Michael Bardanis, moderated by George Belokas discussing both the scientific 'footprint' of this cooperative effort, the organizational challenges and workload required from the two societies and the legacy these two seminars leave both for the two national societies involved and their further cooperation in the future and the example they set for similar bilateral initiatives between other national societies.

ASSOCIAZIONE GEOTECNICA ITALIANA ACTIVITIES

Courses and Technical Seminars
Two major technical courses were held in 2025:

- *Design of Landslide Risk Mitigation Measures* – Catania, 11 April
- *River Embankments: from Understanding Phenomena to Behaviour during Flood Conditions* – Bolzano, 8 May

Pictures from the courses in Bolzano and in Catania

In Memoriam
AGI honoured two distinguished academics through commemorative events:

- *Prof. Augusto Desideri* – Sapienza University of Rome, 16 January
- *Prof. Claudio Mancuso* – University of Naples Federico II, 23–24 January

XXVIII National Geotechnical Conference

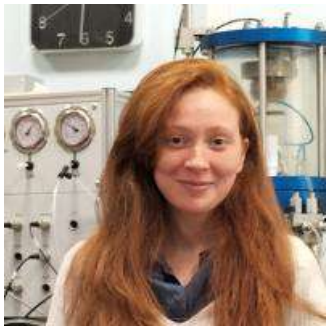
The 28th National Geotechnical Conference took place on *San Servolo Island, Venice* (11–13 June 2025), gathering around **320 participants** and featuring **over 100 papers**. Social events included a guided evening tour of St. Mark's

Basilica, a dinner at the Cloister of San Servolo, and a technical visit to the **MOSE flood protection system**.


XXVIII CNG group of attendees in Venice during lunch break, and the Isle of S. Servolo (Venice - Italy)

Youth Engagement and Education

The *14th Annual Meeting of Young Geotechnical Engineers (IAGIG)* was held in Palermo (4–5 July) with more than **130 young participants** from academia, industry, and the public sector.



Eng. Raffaele Cesaro and *Eng. Alessandro Fraccica* represented Italy at **EYGEC 2025** in North Macedonia (left) and *Dr. Lucia Mele* (University of Naples Federico II) was selected as the Italian delegate to the **ISSMGE Young Member Presidential Group (YMPG)** (right).

Upcoming Events and Initiatives

- **SAIE Bari 2025** (24 October): Workshop on *Reinforcement and Drainage in Reinforced Earth Structures with Geosynthetics*.
- **Guidelines on Energy Geostructures**: To be published in **November 2025**, providing national design and construction standards.
- **AGI-CISM Course** (20–21 November, Udine): Chaired by *Prof. Marco Barla*, introducing the new Energy Geostructures guidelines.
- **XXII Croce Lecture** (18 December): *Prof. Mario Manassero* (Polytechnic University of Turin) will present *"Basic Principles and Recent Advances in Soil Mechanics for Environmental Protection."*
- **Proposed Honour Lecture – Michele Jamiolkowski**: TC102 (In-Situ Testing) of ISSMGE, chaired by *Prof. Jason DeJong*, is exploring the establishment of a lecture dedicated to *Prof. Michele Jamiolkowski*, warmly supported by AGI.

BGA
· THE BRITISH ·
GEOTECHNICAL
ASSOCIATION

NEWS FROM THE BRITISH GEOTECHNICAL ASSOCIATION

The highlight of the British Geotechnical Association's recent activity was our 4th Biennial Conference - Earthworks25 – which took place at the University of Birmingham from 15th to 18th September. The conference focussed on the design and construction of modern earthworks and was attended by more than 270 people.

Keynote lectures were given by Dr John Perry on *'Science, engineering and the development of modern earthworks design and construction'* and by Rodney Bridle on *'Earth Dam Engineering – past, present and future.'* In due course the conference proceedings will be published in the BGA Member's Area and in the ISSMGE online library.

Delegates at the BGA Earthworks25 Conference

Our autumn programme of lectures began on 23rd September with a talk by Dr Andrew Bond on *'Reinforcing the second-generation Eurocode 7'*. It will continue with our 3rd Annual Dinner and Invited Lecture on 7th October at the Institution of Civil Engineers, London. The lecture will be given by Professor Dame Sarah Springman DBE FREng. The title of her lecture is '*From Beaches to the Alps & Home Again: a Story of Geotechnical Engineering, Sport & Leadership*'. The lecture will explore Sarah's journey in geotechnical engineering including landmark projects in Australia and Fiji. Alongside her engineering achievements, Sarah has represented multiple countries as an elite athlete and played a pivotal role in triathlon's inclusion in major international competitions. Her story promises a unique blend of engineering excellence, athletic ambition, and visionary leadership.

This will be followed by the 2025 Géotechnique Lecture on 4th November. The speaker for this prestigious biennial lecture is nominated by the Editorial Panel of Géotechnique. This year's lecture, titled '*Clay behaviour through the (key)hole'* will be given by Professor Beatrice Baudet and looks at taking a different approach to clay behaviour and how characterising soil at the microscale allows us to move towards more phys-

ics-based models. This lecture will be webcast.

Our Early Careers Group continues to thrive and has been forging links with other European groups.

HELLENIC SOCIETY FOR SOIL MECHANICS & GEOTECHNICAL ENGINEERING

THE NEWS OF HSSMGE

Summer 2025 marked two major milestones for the HSSMGE Bulletin (ISSN: 2732-7248)! Issue 200 was published in June 2025, and the August 2025 issue marks 20 consecutive years of publication of the Bulletin! Former HSSMGE President, Dr Christos Tsatsanifos, has been the heart and soul behind this publication and his contribution to our society is gratefully acknowledged.

The cover of the HSSMGE Bulletin no 200 (June 2025)

GROUNDBREAKERS lectures series

The announcement of the inaugural GROUNDBREAKERS lecture of HSSMGE delivered by Dr Dimitrios Terzis.

HSSMGE inaugurated a new series of lectures under the name GROUNDBREAKERS! This series aims to inspire students, young colleagues and geotechnical professionals and researchers by shedding light on the personal and professional paths of distinguished geotechnical engineers from Greece and abroad! The inaugural GROUNDBREAKER lecture was delivered on-line by Dr Dimitrios Terzis, a Research & Teaching Associate EPFL, Co-founder Medusoil Biominerals, on the 10th of September 2025. The lecture was attended on-line by 30 people and the recording is currently being edited so that it becomes available on the channel HSSMGE maintains on YouTube.

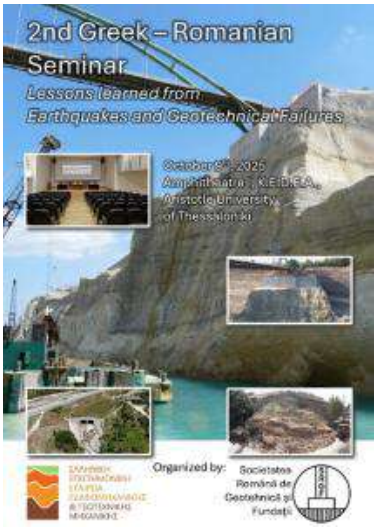
Athenian Lecture on Geotechnical Engineering

The HSSMGE Board has decided on the speaker of the 16th Athenian Lecture on Geotechnical Engineering. Dr Christos Tsatsanifos, former President of HSSMGE, member of the Executive Committee, founder and CEO of Pangaea Consulting Engineers PLC and Editor of the HSSMGE Bulletin will deliver the 16th Athenian Lecture titled *"The contribution of geotechnical engineering in the protection of monuments"* in December 2025. The 1st Athenian Lecture was delivered in 2000 by Harry Poulos, and is given by distinguished geotechnical engineers from Greece or abroad.

Dr Christos Tsatsanifos, former President of HSSMGE

2nd Romanian-Greek Seminar on Earthquakes and Geotechnical Engineering

HSSMGE in cooperation with the Romanian Society for Soil Mechanics and Foundation Engineering (SRGF) proudly announce the 2nd Greek - Romanian Seminar on Earthquake and Geotechnical Engineering "Lessons learned from Earthquakes and Geotechnical Failures" that will be held in Thessaloniki on October 9th 2025. This seminar follows a most successful 1st Romanian – Greek Seminar on Earthquake and Geotechnical Engineering held in Bucharest in March 2025.

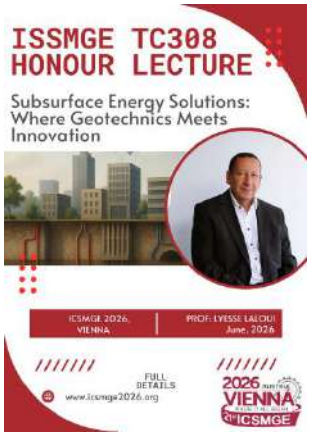


AWARDS

Prof. Lyesse Laloui to Deliver TC308 Honour Lecture at ICSMGE 2026

Professor Lyesse Laloui, **ISSMGE Vice President for Europe**, has been **awarded the TC308 Honour Lecture** at the *21st International Conference on Soil Mechanics and Geotechnical Engineering (ICSMGE 2026)* in Vienna, in recognition of his pioneering contributions to energy geostructures, and sustainable geotechnical innovation.

His lecture, *"Subsurface Energy Solutions: Where Geotechnics Meets Innovation,"* will explore how advances in geotechnical engineering are driving the clean energy transition and enabling climate-resilient infrastructure.



Presented by the **ISSMGE Technical Committee on Energy Geotechnics (TC308)**, the Honour Lecture recognises researchers whose work has made outstanding contributions to the development of the field.

The lecture will be delivered during a semi-plenary session at ICSMGE 2026. Further details are available via the official conference website.

ISSMGE EUROPE CONFERENCES & EVENTS

ICSMGE 2026

The countdown to **ICSMGE 2026** is on! From **14–19 June 2026**, the global geotechnical community will gather at the **Austria Center Vienna** for what promises to be a landmark event.

The response has been extraordinary with **1,420 full papers submitted** from every corner of the world, setting the stage for one of the most comprehensive scientific programmes in the history of the conference. Expect the **Terzaghi Oration**, eight Technical Committee Honour Lectures, State-of-the-Art and Invited Lectures, plus a **Contractors' Session** bringing academia and industry together.

Kicking off the week, the **International Young Geotechnical Engineers Conference (IYGEC)** on **12–13 June** will showcase the talent and energy of the next generation.

With **registration and exhibition bookings opening 15 October 2025**, now is the time to get ready for Vienna. Join us as we shape the future of geotechnical engineering: www.icsmge2026.org.

SIMSG ISSMGE

NOMINATIONS FOR ISSMGE AWARDS

CALL FOR NOMINATIONS FOR ISSMGE AWARDS AT 21st ICSMGE VIENNA 2026

The ISSMGE offers awards to recognise those members who have made important contributions to our profession, society and the world.

The following awards are open for call for nominations in view of the attribution at the 21st International Conference on Soil Mechanics and Foundation Engineering 2026 (21 ICSMGE):

- **ISSMGE Outstanding Technical Committee Award**
- **ISSMGE Outstanding Geotechnical Project Award**
- **ISSMGE Outstanding Innovator Award**
- **ISSMGE Outstanding Member Society Award**
- **ISSMGE Outstanding Paper Published in the International Journal of Geo-Engineering Case Histories Award**
- **ISSMGE Outstanding Public Relations Award**
- **ISSMGE Outstanding Young Geotechnical Engineer Award**

Guidelines for the nomination of the various awards can be found here.

All nominations must be made through the local ISSMGE Member Society (except the Outstanding Paper Award and the Outstanding Technical Committee Award) and must reach the ISSMGE Secretariat by **31 December 2025 (extended deadline)** in time for the 21st International Conference on Soil Mechanics and Geotechnical Engineering (21 ICSMGE 2026) to be held in Vienna, Austria in 2026.

XVIII DECGE BUDAPEST 2027

Call for abstracts

About the DECGE Conferences

The **Danube-European Conference on Geotechnical Engineering (DECGE)** was launched in 1964 by the Austrian Society of Engineers and Architects (ÖIAV), inspired by the legacy of **Prof. Karl Terzaghi**. Its founding goal was to unite geotechnical experts from East and West, bridging divides during the "Iron Curtain" era.

The Danube region faces enduring geotechnical challenges — from flood protection and riverbank stability to hydropower development and ecological restoration — now intensified by climate change. The **XVIII DECGE**, dedicated to *"Geotechnical Engineering for Resilience and Sustainability,"* will explore both long-standing and emerging issues shaping the region's future.

Following the success of the **XVII DECGE in Bucharest (2023)**, **Budapest** will host the next edition in **2027**, con-

tinuing a proud tradition of collaboration and innovation across the Danube region and beyond.

Conference themes

- Geotechnical characterization and modelling
- Eurocode 2nd generation: design methodologies
- Sustainable geotechnologies and materials
- Urban and transportation geotechnical resilience
- Sustainable renovation methods
- Environmental Geotechnics and climate adaptation
- Geohazard, risk, monitoring and mitigation
- Digital transformation and data-driven geotechnics

"I warmly invite colleagues from across Europe and beyond to join us in Budapest for the 18th Danube-European Conference on Geotechnical Engineering. Building on the region's tradition of scientific exchange, the conference offers a vital forum to address global challenges in geotechnics and to advance resilience and sustainability together."

Lyesse Laloui, Vice-president, Europe, ISSMGE

Important dates

- **Abstract submission: 15 January 2026.**
- **Abstract acceptance: 15 March 2026.**
- **Paper submission: 15 September 2026.**
- **Paper acceptance: 15 November 2026.**
- **Final paper submission:15 January 2027**
- **Conference: 9-12 June 2027.**

Budapest

Budapest is one of Europe's most vibrant and picturesque capitals. With its grand boulevards, leafy parks, Art Nouveau architecture, and lively cafés, the city blends elegance with energy. The Danube divides Buda and Pest, linked by iconic bridges that frame world-famous landmarks such as the Buda Castle District, the Parliament Building, and the historic Gellért Baths; many recognized as UNESCO World Heritage sites.

Venue

The **XVIII DECGE** will be held at the **Lágymányos Campus of Eötvös Loránd University (ELTE)**, one of Hungary's oldest and most prestigious universities. Located on the Buda side of the Danube between the Petőfi and Rákóczi Bridges, the modern riverside buildings offer an inspiring setting with excellent conference and exhibition facilities. In good weather, participants can enjoy the terrace's panoramic views over the Danube and Budapest's historic skyline.

Organizers

The 18th Danube-European Conference on Geotechnical Engineering is organized by the Hungarian Geotechnical Society, in collaboration with the Geotechnical Section of the Hungarian Chamber of Engineers, Széchenyi István University, the Budapest University of Technology and Economics, the Hungarian Tunnelling Association, and Óbuda University.

Find out more at: **18decge.hu**

Hungarian Geotechnical Society

International Society for Soil Mechanics and Geotechnical Engineering

ISSMGE EUROPE COMMUNICATIONS

We kindly encourage all Societies to share this newsletter with your members, students, and professional networks. The more voices we reach, the stronger our European geotechnical community becomes.

To make this process easier, we offer two options:

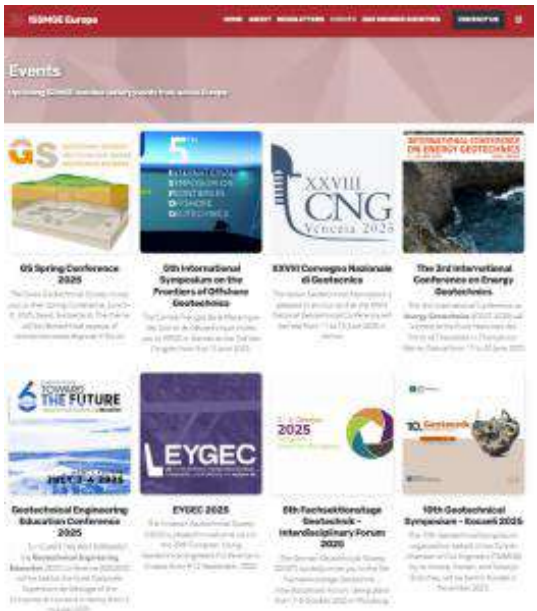
- **Newsletter Sign-Up** – Individuals can subscribe directly via our website: Subscribe here
- **Mailing List Sharing** – If your society maintains a member mailing list, you're welcome to securely share those contacts with us (with appropriate consent), and we'll handle distribution on your behalf—reducing your admin-

istrative workload.

Let's work together to ensure timely updates, opportunities, and success stories reach all corners of our community.

For any questions, contact us at: vpeurope.issmge@epfl.ch

STAY CONNECTED: issmge-e.eu



Don't forget to visit the **ISSMGE Europe website**, the central platform for updates across our regional community.

www.issmge-e.eu

There you'll find:

- A regularly updated listing of **events from national societies**
- An **archive of past newsletters**
- The latest announcements shared by our members

If your society is organising a conference, course, or other activity you'd like to highlight, we welcome your contributions.

Send details to: **vpeurope.issmge@epfl.ch**

The site and newsletters are shaped by what you share. Thank you for helping us keep the community informed.

LinkedIn Page: ISSMGE Europe on LinkedIn

Follow us to stay updated on innovations, community highlights, and opportunities to engage across the geotechnical field in Europe.

These platforms are your gateway to the evolving landscape of geotechnical engineering in Europe.

Help us grow—share these links with your society members, students, and colleagues!

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

ITA@NEWS

#78 - June 2025

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

MESSAGE FROM THE ITA PRESIDENT

What a memorable few days we shared in Belgrade for the 11th ITA Tunnelling Awards!

For the first time, our new Award Organisation Guidelines were applied, with ITA Serbia leading the organisation and the Executive Council, Advisors, and Judges fully engaged.

The response was extraordinary: more than 400 participants, outstanding support from the industry, and almost 30 sponsors backing the ITA Tunnelling Awards, 25 finalists across seven categories — a true showcase of underground excellence from every corner of the globe.

Andrea Pigorini
President of ITA 2025-2028

Read the full Message from the President on the News Page

- ITA Tunnelling Awards 2025: Honouring Global Excellence Read more
- ITA WTC2026 registration is open Read more
- Working Group 17 visiting Rogfast Read more
- Guidelines of Selection of Shaft Construction Method Read more
- ITACET Lunchtime Lecture Series #49 Read more
- Drive Our Brand Forward – Head of Communication Read more
- Himalayan Tunnel Breakthrough for Herrenknecht TBMs Read more
- Mapei Powers Major Underground Works Read more
- Trelleborg unveils first EPD for tunnel seals Read more
- Fit for the Future Read more
- Crete's Twin Tunnels Link New Airport to Heraklion Read more
- FAMA: Innovative Solution for Sewer Tunnel Read more
- Terra Terra – Insights from Below Read more
- Hagerbach Test Gallery – The Underground Future Lab Read more

International Commission on Large Dams

www.icold-cigb.org/article/GB/news/newsletters/newsletter-24-2

We are pleased to share with you the latest edition of the Newsletter (#24).

A comprehensive 40-page publication highlighting key developments, innovations, and global perspectives in the world of dams and water infrastructure.

What's inside this issue:

- **Editorial by ICOLD President Devendra K. Sharma**: Safety, Inclusion & Innovation at the heart of ICOLD's mission.
- **Highlights from the ICOLD Congress 2025 in Chengdu**: Over 2,400 delegates from 85 countries.
- **ICOLD Innovation Awards**: Discover the 3 winning projects shaping the future of dam engineering.
- **Launch of the ICOLD Dam Incident Database**: A new online demonstrator for global safety insights.
- **Changing public perception of dams in Japan**: A powerful story of transformation.
- **Jordan joins ICOLD**: Strengthening global cooperation in water management.
- **The Chengdu World Declaration**: Dams as key solutions for climate adaptation and energy transition.
- **9 New Bulletins released**: this is the heart of ICOLD. These bulletins provide essential insights for engineers, policymakers, and researchers working to improve dam safety and sustainability worldwide.
- **Technical insights on hybrid energy systems**, advanced dam construction, and sustainable sediment management in China on the Yalong River.
- Coverage of **AFRICA 2025** with Hydropower & Dams

Save the Dates:

- **ICOLD 2026** – Guadalajara, Mexico | May 23–29, 2026
- **HYDRO 2025** – Thessaloniki, Greece | October 22–24, 2025

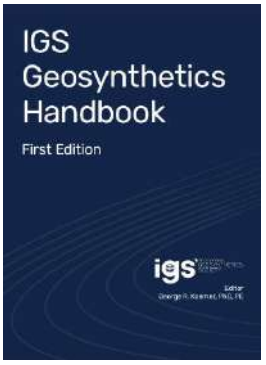
Download the Newsletter #24 now [ICOLD Website - Newsletter 24.pdf]

INTERNATIONAL GEOSYNTHETICS SOCIETY

October 2025

Helping the world understand the value and appropriate use of geosynthetics

IGS Geosynthetics Handbook Available To Buy Now



The long-awaited **IGS Geosynthetics Handbook** is now available to buy. A one-stop technical reference guide suitable for all levels of experience in geosynthetics. The handbook offers a concise yet comprehensive summary of the fundamental applications of geosynthetics and is an essential reference guide for student, instructor or civil engineering professional alike.

Non member price: $200 USD
Member price: $150 USD

IGS Chapters can access a bulk buy discount of 30 copies or more at $75 USD per copy, for this option only, contact igs-sec@geosyntheticssociety.org.

Get Your Handbook Today

EuroGeo9 Host Announced

We're delighted to announce that IGS Portugal has won the bid to host EuroGeo9, taking place in Porto in September 2029. The sustainability-led programme will include keynote lectures, a full technical programme across all IGS committees, themed sessions, short courses, field trips to coastal

resilience projects, and a gala at the Palácio da Bolsa. Registration and the conference website will launch in 2027.

Read all about the winning bid **by visiting our website**.

IGS at Industry Events

This month we have attended HYDRO 2025 in Thessaloniki, Greece, where we spoke to industry leaders and shared our vision for a more sustainable future through geosynthetics. During the conference, we were joined by members of our Premium Corporate Member group and IGS Greece.

Next we'll be heading to Tailings & Mine Waste, Banff (2–5 Nov 2025). Thank you to our Premium Corporate Members for supporting the IGS in attending these insightful events and helping us expand awareness of how geosynthetics contribute to resilient, cost-effective and sustainable infrastructure.


IGS Chapter News

Vision And Collaboration Rewarded In IGS Europe Awards
During EuroGeo8 we celebrated the exceptional contribution of IGS members from the European region, the IGS European Regional Activities Committee (ERAC) announced seven accolades, presented by IGS President Samuel Allen at the recent EuroGeo8 conference. Find the full list of award winners **by visiting our website**.

IGS's First Student Club Reveals Inaugural Events
The Society's first geosynthetics club for university undergraduates has announced an exciting timetable for its launch term. Founded earlier this year, the International Geosynthetics Society at California State University, Long Beach (IGS at CSULB), aims to place geosynthetics at the heart of student learning outside a classroom setting, as well as inspiring careers in the industry. Learn more about the first Student Club **by visiting our website**.

China's Young Members Gather For Conference
China's next generation of geosynthetics professionals shared their latest research at the 3rd Youth Forum of the China Technical Association on Geosynthetics (CTAG). The event is held every two years by the Young Members Committee (YMC) of CTAG, which IGS China (CCIGS) is part of, and this year welcomed some 200 delegates to the Shangde International Hotel venue in Urumqi, Xinjiang Province in Northwest China. Learn more **by visiting our website**.



IGS Greece Celebrates 20 Years
Happy 20th, IGS Greece! Two decades on, IGS Greece is boosting membership, running high-impact training (including Educate the Educators), and rolling out student lectures and workshops to grow geosynthetics practice in Greece. Learn more about the Chapter's history **by visiting our website**.

Call for Candidates for IGS Council

Call for Candidates for the next IGS Council, including the positions of President and Vice President, for the 2026–2030 term, is now officially open. We invite all interested and eligible IGS members to submit their nominations to help lead the IGS in the coming term.

Visit our website to find full details, including key dates, eligibility criteria, and submission requirements.

Upcoming Events

Explore the upcoming IGS events, industry events we will be attending and events delivered by IGS Chapters.

2–5 Nov 2025 Tailings & Mine Waste Banff, Alberta, Canada
Specialist dialogue on containment, monitoring and long-term stewardship. Visit our stand for handbook previews and technical dialogue. Event page

17–20 Nov 2025 ISO/TC 221 Meeting Rio de Janeiro, Brazil
Technical committee meeting covering standards for geosynthetics. Event page

04–06 Feb 2026 ASTM D35 Meeting Atlanta, Georgia, USA
Committee meeting on geosynthetics standards, useful for practitioners involved in test methods and specifications. Event page

30 Jun–02 Jul 2026 CEN TC 189 Meetings Copenhagen, Denmark
European standards committee meetings on geosynthetics, relevant for European practitioners and manufacturers. Event page

13–17 Sep 2026 13th International Conference on Geosynthetics Montreal, Canada
The conference theme, **"Legacy, Evolution & Revolution in Geosynthetics,"** emphasizes innovation, sustainability, and global collaboration. Scheduled at the Palais des congrès de Montréal, attendees can access technical sessions, workshops, and networking opportunities. Event page

Geosynthetics International
www.icevirtuallibrary.com/toc/jgein/32/6

Κυκλοφόρησε το τεύχος Volume 32, Issue 6, October, 2025 του Geosynthetics International της International Geosynthetics Society με τα ακόλουθα περιεχόμενα:

Dynamic response of rubber-sand bags: application for machine foundations, S. N. Moghaddas Tafreshi; M. A. Norouzzadeh; R. Zakeri; A. R. Dawson

Particle size effect on the mechanical behavior of coral sand – geogrid interfaces, Z. Chao; J. Zhou; D. Shi; J. Zheng

Effect of temperature on geogrid-soil interface performance based on pullout test, H. Han; C. Xiao; N. Zhu; L. Ding

Natural weathering effects on white, green, and black HDPE textured GMs, M. A. Aparicio-Ardila; M. Kobelnik; C. A. Valentin; C. F. Palomino; L. P. Sabogal-Paz; J. Lins Silva

Geotechnical characterization of soil-rubber mixtures with well-graded gravel, A. Fiamingo; G. Chiaro; A. Murali; M. R. Massimino

Comparing CO_2 emissions: ordinary stone vs. geosynthetic encased columns, D. Erten; E. Guler; O. Detert; A. A. Lavasan; S. Taetz

Seismic performance of thinner rubber-sand mixture cushion reinforced by geosynthetics, F. Liu; X. Zeng; M. Wu; J. He; Z. Jie

Performance of geogrid- and geotextile- reinforced low to moderately expansive subgrades, S. Srivastava; U. Balunaini

Mechanical properties of SCA modified EPS lightweight soil and modification mechanism, P. Jiang; Y. Fu; L. Chen; W. Wang; N. Li; B. Qian

Discussion

Particle shape effect on interfacial properties between granular materials and geotextile, A. Cherif Taiba; Y. Mahmoudi; M. Belkhatir

Geotextiles and Geomembranes
www.sciencedirect.com/journal/geotextiles-and-geomembranes/vol/53/issue/5

Κυκλοφόρησε το τεύχος Volume 53, Issue 5, October, 2025 του Geotextiles and Geomembranes της International Geosynthetics Society με τα ακόλουθα περιεχόμενα:

Editorial Board Page ii

Leakage of composite cutoff walls through geomembrane joint defects, Lin-Feng Cao, Yu-Chao Li, Bo Huang, Pages 1063-1075

Performance evaluation of geocell-reinforced pavements overlying black cotton soil, Sayanti Banerjee, Bappaditya Manna, J.T. Shahu, Pages 1076-1093

Mechanical properties and mechanisms of soil-geotextile interface under constant normal Stiffness: Effect of freezing conditions, Pengfei He, Ce Zhuang, Xiangbing Kong, Boyang Liu, Fuping Zhang, Pages 1094-1107

Investigation on relationship of geogrid strain and settlement in the GRPS embankment under cyclic loading, Kaifu Liu, Shiyu Xu, Zhangbo Wan, Minjie Wen, Kairen Xue, Pages 1108-1121

Response of isolated footing on a geogrid reinforced fill and undisturbed peat subgrade soil system, Aykut Erol, Zulkuf Kaya, Pages 1122-1144

Load-induced strain analysis in geocell reinforced footing systems, Sarper Demirdogen, Ayhan Gurbuz, Pages 1156-1167

Experimental investigation of the capillary drainage performance of multilayer wicking fabric, Yifan Wang, Yongkang Wu, Xu Li, Shaowei Wei, Hongye Yan, Pages 1168-1183

Consolidation solution of ground improved with artificial solidified crust–vertical drain, Long Chen, Desheng Li, Yonghui Chen, Yi Zhu, Kaizhe Shang, Pages 1145-1155

ΕΚΤΕΛΕΣΤΙΚΗ ΕΠΙΤΡΟΠΗ ΕΕΕΕΓΜ (2023 – 2026)

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