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

ATHENS TC301

ΕΛΛΗΝΙΚΗ ΕΠΙΣΤΗΜΟΝΙΚΗ ΕΤΑΙΡΕΙΑ ΕΔΑΦΟΜΗΧΑΝΙΚΗΣ & ΓΕΩΤΕΧΝΙΚΗΣ ΜΗΧΑΝΙΚΗΣ

Τα Νέα της Ε Ε Ε Ε Γ Μ

183

Αρ. 183 – ΙΑΝΟΥΑΡΙΟΣ 2024

Καλή Χρονιά με Υγεία, Αγάπη, Ευτυχία, Χαρά και Επιτυχίες

SIMSG ISSMGE

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ISSN: 2732-7248

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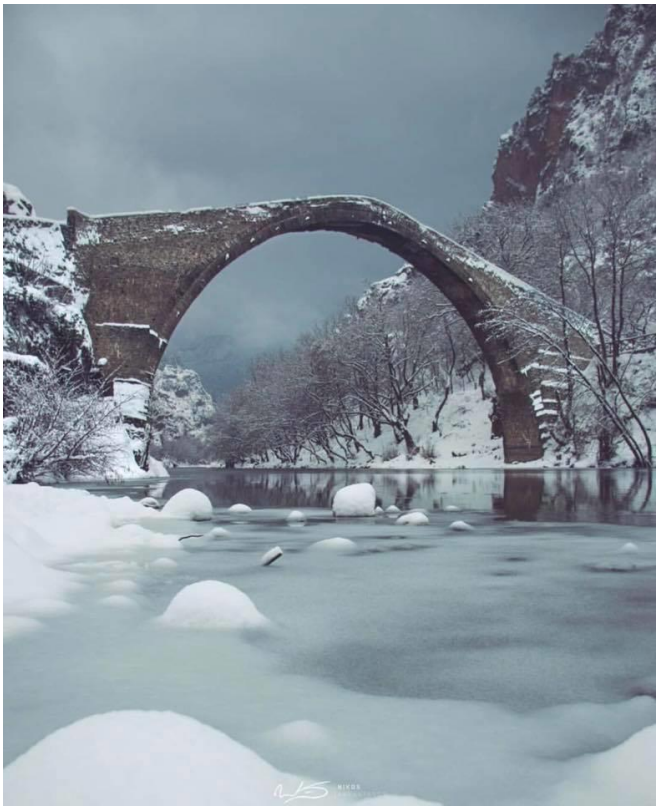


Γέφυρα Κόνιτσας

4TH INTERNATIONAL SYMPOSIUM

PRESERVATION OF MONUMENTS & HISTORIC SITES

SEPTEMBER 2026 | ATHENS, GREECE

JOIN US IN ATHENS

The Hellenic Society for Soil Mechanics and Geotechnical Engineering (HSSMGE) is pleased to invite you to participate in the 4th International Symposium on Geotechnical Engineering for the Preservation of Monuments and Historic Sites, which will be held on **September 2026 in Athens, Greece**.

This is the premier event on Historic Sites Preservation organized by the Technical Committee 301 of the International Society for Soil Mechanics and Geotechnical Engineering (ISSGME).

CONFERENCE FOCUS

The legacy of the Ground Monument System

"Masonry constructions, foundations and ground can hardly be distinguished and should be considered integral parts of a single system." R. Jappelli

Global challenges ahead

The preservation of the Ground Monument System has reached a turning point calling for immediate action. To ensure that humanity's treasures will not be lost to climate change or damaged beyond repair by natural and man-made hazards we need to explore advanced analytical tools and techniques and introduce new methods of working and collaboration so as to leverage the major advances in material and engineering science and promote knowledge transfer between research and restoration practice.

CONFERENCE THEMES

TRADITIONAL TOPICS

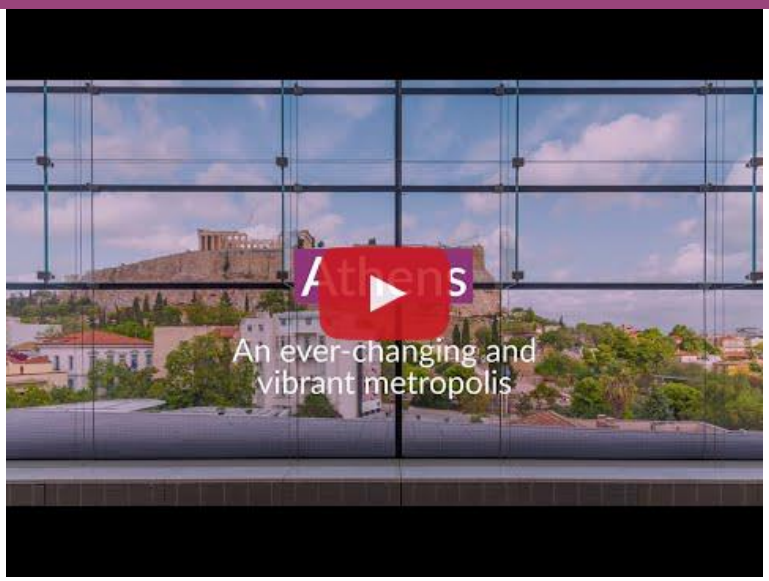
- Principles of conservation, maintenance strategies, case histories
- Site investigations and monitoring of cultural heritage sites affected by natural and man-made hazards
- Seismic risk, site effects, soil structure interaction
- Effects of urban development and tunnelling on built heritage
- Preservation of diffuse heritage: soil instability, subsidence, environmental damages

EMERGING AREAS

- Digital technologies for the investigation of monuments and sites
- Monument preservation in a changing climate: dealing with increasing temperatures and extreme weather
- Climate adaptation measures for built heritage treasures
- Heritage conservation: promoting interdisciplinarity and restoring synergies between science and practice

LOCATION

From the iconic Acropolis rock to the well-preserved ancient ruins of the Athenian neighborhood, Athenian monuments serve as a stipulating backdrop for discussions on the protection of cultural heritage. Their resilience is an inspiration for academics and practitioners seeking strategies to safeguard the future of our shared cultural legacy.



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Conference Website is coming soon!

Register here for updates

UNDER THE AUSPICES OF

HELLENIC SOCIETY FOR SOIL MECHANICS & GEOTECHNICAL ENGINEERING

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ΑΡΘΡΑ

The Severn Tunnel
Victorian Built Underwater Tunnel

The Severn Tunnel is a railway tunnel in the United Kingdom, linking South Gloucestershire in the west of England to Monmouthshire in Wales.

The tunnel is 7,008 m (4.355 mi) long; with 3,621 m (2.250 mi) of it under the river. It was the longest underwater tunnel in the world until 1987.

The tunnel was completed in 1886 by John Hawkshaw on behalf of the Great Western Railway.

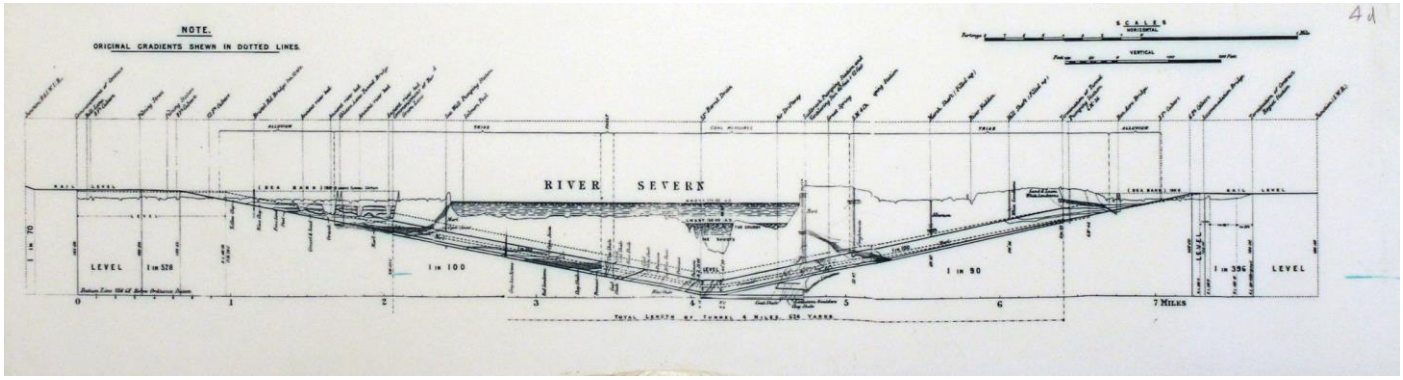
Construction began in 1873. Work progressed relatively smoothly until 1879, at which point a significant flooding occurred from what we now know as "The Great Spring". Flooding was ultimately contained, by the installation of greatly-increased pumping facilities and sending a diver down a shaft and 300 m along the tunnel heading to close a watertight door sealing off the waters, allowing construction to continue.

The diver who achieved this was Alexander Lambert, equipped with Henry Fleuss' newly developed self-contained rebreather apparatus, which negated the need for a trailing hose.

Construction continued to encounter flooding problems but ultimately the team were successful and the line was opened.

There is a continuous drainage culvert between the tracks to lead ground water away to the lowest point of the tunnel, under Sudbrook Pumping Station, where it is pumped to the surface.

It has been estimated that upwards of 50,000,000 litres per day of fresh water are typically being pumped from the tunnel by Sudbrook Pumping Station.



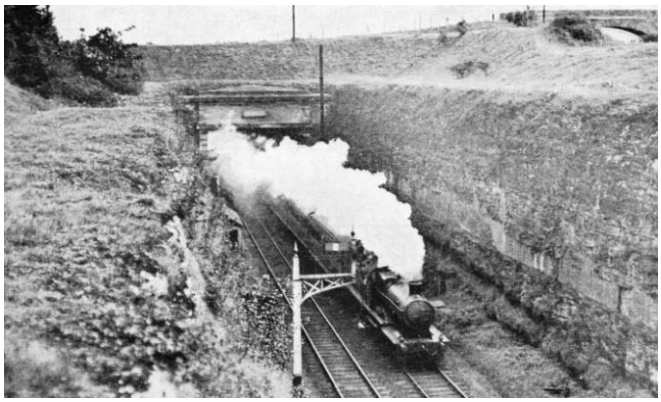
As such there are a myriad of safety, maintenance, and backup measures in place.

Estimates are that the tunnel would be full of water within 26 minutes if the pumps were switched off and backup measures failed.

Despite all these challenge the tunnel is still in use today and is even fully electrified.

https://www.linkedin.com/in/tunnels-and-tunnelling-international?miniProfileUrn=urn%3Ali%3Afsd_profile%3AACoAADT-VHQBnZlTJltTG2nV23S157_0bTtvmik&lipi=urn%3Ali%3Apage%3Ad_flagship3_groups_entity%3BNsXWUJTYRi-yGSxhF7rOxKA%3D%3D

The Severn Tunnel
One of the Longest Under-water Tunnels in the World



THE WELSH PORTAL of the Severn Tunnel is 4 miles 624 yards from the Gloucestershire entrance, and of this distance 2¼ miles are underneath the River Severn. The total length, including approaches, is approximately seven miles.

THE River Severn has always formed, at its mouth, a serious obstacle to through traffic between South Wales and Bristol and the south-west of England. The natural barrier of a wide estuary is made more difficult by exceptional tidal conditions.

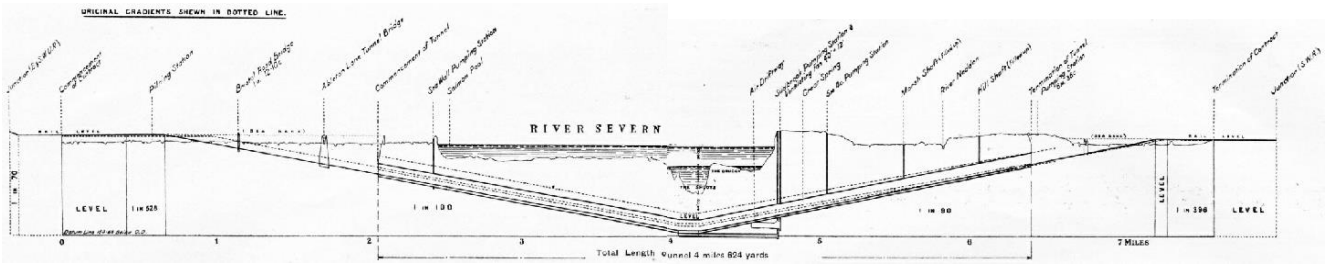
Until quite modern times the crossing of the Severn estuary had to be made by boat, and the passage was, to a greater or less extent, dependent on the state of the tide. Apart from craft of all kinds that followed no regular course, three established ferries are known to have existed. There was an ancient crossing from the Gloucestershire side to Sudbrook, in Monmouthshire, near the remains of a camp that guarded a ferry on the route between the Roman stations of Aquae Solis (Bath) and Venta Silurum (Caerwent). The Old Passage, higher up, joined the Gloucestershire village of Aust with Beachley, near the mouth of the Wye. The New Passage led from a point beyond the hamlet of Redwick, in Gloucestershire, to a landing-place just east of Portskewett and close to Sudbrook. After the coming of the railways the old-time ferry on the New Passage route was replaced by a steam ferry, which conveyed passengers travelling by the Bristol and South Wales Union Railway. This railway, with its ferry piers, was the forerunner of the Severn Tunnel. The steam ferry service was opened in 1863, and for twenty-five years worked without a serious accident.

The traffic along this route increased to such a degree that the steam ferry soon became unequal to its task, and other schemes were considered for bridging or tunnelling

In 1872 the Severn Tunnel Railway Act, after many vicissitudes, received the Royal Assent. The Great Western Railway undertook the construction of the tunnel. Mr. Charles Richardson, the originator of the adopted scheme, was made engineer-in-charge, and Sir John Hawkshaw the consulting engineer.

Briefly, the plan envisaged the making of a railway from a point on the Bristol and South Wales Union Railway east of Pilning to the Gloucestershire shore, from there under the Severn, and thence to a junction with the main line at Rogiet, now called Severn Tunnel Junction.

The length of the Severn Tunnel is 4 miles 624 yards, of which two miles and a quarter are under the river. Of the remainder about half a mile is in Gloucestershire and the balance in Monmouthshire. Including the approaches, the total length is approximately seven miles. If we except the London Tube railways, the Severn Tunnel is the longest railway tunnel in the British Isles; it is also one of the longest underwater tunnels in the world.



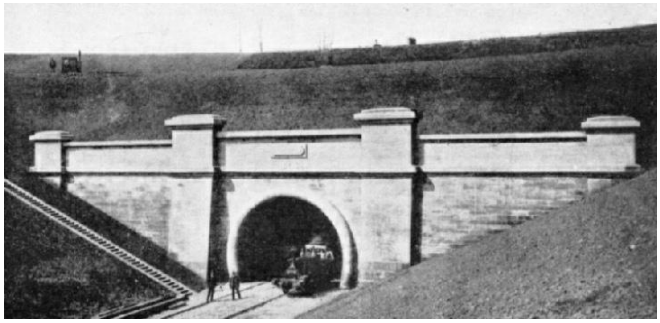
A GIGANTIC WORK. This diagram show the tunnel in section as it would appear to an observer looking down-stream. To the left is the English shore, and the figures along the bottom of the diagram show the mileage. The gradients are indicated above them.

As will be seen from the longitudinal section, shown above, the line is level for some chains under the deepest part of the river, but rises at a gradient of 1 in 100 towards the Gloucestershire side, and at 1 in 90 towards the Monmouthshire side.

The tunnel was designed to have a depth sufficient to enable the building of a roof 30 ft thick (subsequently increased to 50 ft between the top of the arch and the lowest part of the river bottom). The latter is formed by the Shoots, a deep-water channel containing, even at low tide, a depth of 80 ft of water, and having a surface width of about 400 yards. Throughout the remaining width of the estuary the exterior of the tunnel was to be partly exposed at full ebb, standing in places 15 ft above water-level.

The Great Western Railway Company lost no time in setting to work, and began operations early in 1873.

It will help to state briefly the general scheme of construction. From each shaft, which was sunk at a defined depth, top and bottom headings were driven in both directions on the centre line of the tunnel. As the excavation proceeded, the headings approached one another, and ended by forming a continuous passage along the full length of the tunnel, the floor of the bottom heading coinciding with the intended tunnel floor. The dimensions for the headings were fixed at 7 ft square, and were afterwards described as the "Seven Foot Heading". In addition to affording access to the heading, the shafts served for purposes of ventilation, and to admit pumps for raising and ejecting the water which is always encountered on such an undertaking. From the Seven Foot Heading the rock and earth above and alongside had to be hollowed out to the full cross-sectional dimensions of the tunnel. Since the tunnel was designed to carry two lines of track, the width was fixed at 26 ft. The semicircular arch of 13 ft radius was to spring from side walls 7 ft above rail level, and the depth between rail level and the tunnel invert was to be 4 ft 6-in.



THE ENGLISH ENTRANCE is in Gloucestershire, and is about one-third of a mile from the bank of the River Severn. From this point the tunnel descends at a gradient of 1 in 100 down to the short level stretch under the Shoots, near the Welsh bank.

In view of the fact that at low tide the river shrank to the width of the Shoots Channel, it will be realized that this channel was the key to the entire undertaking. If the tunnel were practicable under that 400 yards there could be no doubt as to the success of the whole venture.

Before work was begun careful soundings were taken to ascertain the contours of the river below the Shoots. Where the centre line of the tunnel was determined, the soundings were multiplied until the recorded depths were barely 2 ft. apart from one side of the channel to the other. To explore the strata that would be met with in the excavation of the tunnel, a shaft 15 ft in diameter was sunk to a depth of 200 ft on the Monmouthshire or west side of the Severn at Sudbrook Cliff. From there the driving of a heading eastwards under the river was begun. This heading was to rise gradually from its bottom and eventually drain the tunnel at its lowest point. To this end land was acquired, accommodation was provided nearby for the workmen, and a temporary railway was laid to connect with Portskewett Station for the conveyance of winding engines, bricks, timber, and so forth to the site of the shaft.

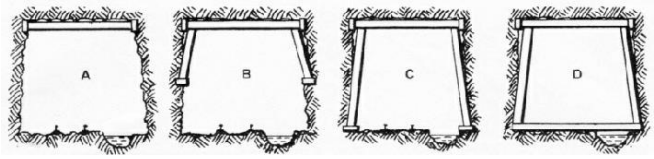
The headings were driven by drilling and by blasting where rock was encountered. Hand-drills and common blasting powder were used at first, but subsequently machine drills and dynamite were substituted. The drills were driven by compressed air, which was taken along the heading as the work advanced in a 6-in pipe having a rubber hose at the working end which could be attached to the drilling machine.

With the rather limited plant available progress was very slow. By August, 1877, after four and a half years' work, only one shaft, afterwards known as the Old Shaft, had been sunk, and only about 1,600 yards of Seven Foot Heading had been driven under the river. A second shaft had been begun, but it was only half sunk and not lined. In this shaft it was intended to fix the permanent pumps.

AT THE MONMOUTHSHIRE END the gradient is steeper than that on the English side of the tunnel, the figures being 1 in 90. The line to the right is a temporary one, laid by the contractors.

The Great Western Railway now invited tenders for carrying out the whole of the work. Two contracts were let, one to Oliver Norris of New Passage, and the other to Rowland Brotherhood. Norris engaged to sink a shaft on the Gloucestershire side, known subsequently as the Sea Wall Shaft, and to drive Seven Foot Headings east and west of it. Brotherhood undertook to sink two shafts on the Monmouthshire side, a little way west of Sudbrook, and to drive similar headings in either direction. These two shafts were afterwards known as the Marsh Shaft and Hill Shaft respectively. The headings were to follow the gradient designed for the tunnel.

Pumps capable of dealing with the water encountered in the workings were installed in these shafts, as well as in the permanent one at Sudbrook, now completed and known subsequently from its lining as the Iron Shaft. This was, indeed, lined with iron, except for the bottom 10 ft, which were brick-lined. Its position was some twenty-seven yards from the old shaft mentioned above, and clear of the side of the tunnel. A cross-heading between the Iron Shaft and the main heading was constructed as a means of access and divided by a door.



HEADINGS WHERE ROCK WAS ENCOUNTERED were arranged as shown. A, head tree only; B, head tree and supports; C, with side trees; and D, with side trees and cills.

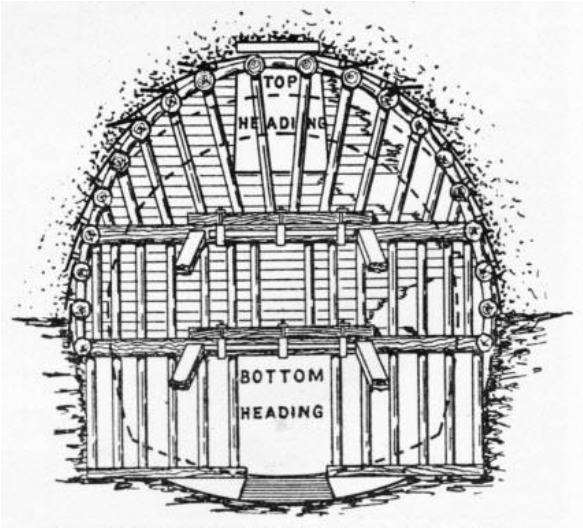
From this point work progressed regularly until the middle of October, 1879, when the heading from the Old Shaft had been driven some two miles under the river. It reached within 130 yards of the west heading from the Sea Wall Shaft. Work on the other headings in each direction had also progressed favourably, including that on a heading from the Old Shaft at a higher level than the original one.

On October 16, 1879, a terrible setback occurred. A big freshwater spring was suddenly pierced. Volumes of water poured in at the rate of 6,000 gallons a minute from this source alone. The pumps had previously dealt successfully with more than 2,000 gallons a minute, but they could not cope with this additional burden. They were overpowered after having worked at full speed for nearly twenty-four hours. The work associated with the Sudbrook Shaft under the river was entirely flooded, cascades falling down the 40 ft depth of the shaft. Fortunately none of the men at work suffered any injury other than a wetting, as they were able to escape through the cross-heading and the door into the Iron Shaft. The spring thus freed, thenceforth known as the Great Spring, has ever since demanded its daily quota of energy from the powerful pumping plant with which first the works, and finally the tunnel, had to be equipped.

This was indeed a blow for the railway company. Sir John Hawkshaw, the Consulting Engineer, was immediately asked to undertake the chief responsibility, Mr. Charles Richardson acting as joint engineer. On the advice of Sir John, Mr. Thomas A. Walker (a contractor with whom he had shared previous tunnel experience) was entrusted with the task of completing the work. He took possession on December 18, 1879. The desolation of the scene which confronted him can be imagined.

Sir John now decided to lower the tunnel under the Shoots fifteen feet. This entailed deepening all the shafts, and the building of a new drain from the new bottom under the Shoots to the pumping shaft, converting the existing bottom heading into a top heading. Larger pumps and engines were ordered and four new shafts constructed - one at Sudbrook, another at the Sea Wall, and two at a point twenty-six chains west of the Sudbrook shafts beyond where the Great Spring

had broken in. The object was to collect all the water from the spring and to keep the rest of the work dry. Owing to various delays and unforeseen incidents the works were not cleared of water until December 7, 1880.



COMPLETED TIMBERING for full-sized tunnel in soft ground. The dotted lines indicate the cross-section of the tunnel.

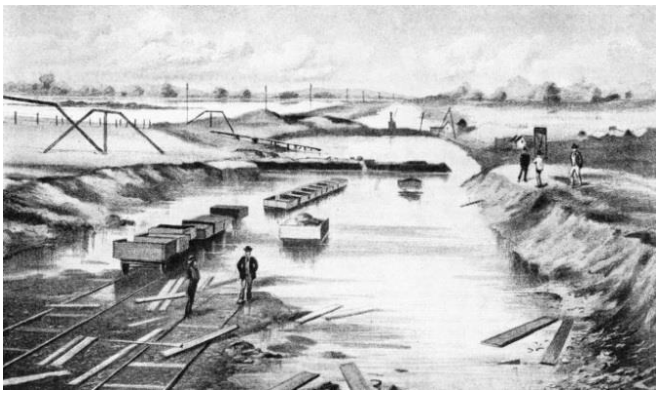
Work underground was now pushed forward with great energy. A strong wall was built to imprison the Great Spring, thus isolating it completely from the works. By this time a small town, accommodating the workmen, had sprung up at Sudbrook; it had its mission room, school, hospital and post office, besides engine houses and the buildings of the tunnel works.

At the Sea Wall Shaft on the English side of the river, the brick arching of the tunnel had been begun in December, and bricklayers were at work when, quite unexpectedly, salt water burst in from the roof, putting them to flight. Above, at low water, was a pool near the shore called the Salmon Pool, where the thickness of roof over the tunnel was only about three feet and where it had been originally intended to concrete over the river bottom. A number of the men, joining hands, were sent to walk through the pool to find the hole. One of them found it and suddenly disappeared, having to be rescued by his neighbours. The river bed at the spot was overlaid with large quantities of clay, and pumping operations, which had meanwhile been stopped to prevent the enlargement of the leak by the inrush of water, were resumed without incident. The brick arching was extended rapidly past the spot with a thickness of 4 ft instead of the normal 2 ft 3-in.

The severe snowstorm of January, 1881, caused great hardships, and held up the supply of coal and other material for three days. Coal was borrowed from farms and cottages in the immediate vicinity and timber was also pressed into service. Thus there was enough fuel to keep the pumps going, although the severe frost which followed prevented all surface operations for about a fortnight.

On September 26, 1881, the two Seven Foot Headings were joined up and extended as one clear passage-way or preliminary tunnel for the full distance of two miles and a quarter from Sudbrook to the Sea Wall Shafts. This permitted the establishment of through ventilation by means of a fan at Sudbrook, in place of compressed air.

At the beginning of 1882, sixty yards of the Seven Foot Heading had been expanded into the full-sized tunnel from the Sea Wall Shaft, and 300 yards of the tunnel arch were completed north-westwards from that point. Work now progressed expeditiously. In that year a length of 3,774 yards of tunnel was completed.



A DISASTROUS FLOOD occurred on the night of October 17, 1883, when a tidal wave, 5 ft to 6 ft high, inundated the workings and imprisoned eighty-three men working in the tunnel. They were rescued the following day.

On October 10, 1883, a further setback occurred; the Great Spring again flowed into the tunnel in much greater volume than before, completely flooding the works at Sudbrook and under the river. A further misfortune occurred a few days later when the largest pump installed in the shaft twenty-seven chains west of Sudbrook broke down, and in a few hours water also submerged the detached works. Misfortune continued to dog the enterprise, for on the night of October 17 a tidal wave 5 ft to 6 ft high inundated the lowlands to the westward, and poured into the 100-ft depth of the low-lying Marsh Shaft, extinguishing the fires of the pumping engines. The water imprisoned eighty-three men working in the tunnel below, and only two or three escaped up the ladder through the streams of water flowing down. The water then rose to within eight feet of the tunnel roof. A small boat was lowered end-on down the shaft and launched in the water in the tunnel. The men in the boat succeeded in reaching those who had retreated to the staging, and brought them back in safety to the shaft on the morning after the disaster.

The Water Peril

As can well be imagined, at this date, October 18, 1883, the plight of the tunnel works was, if anything, worse than at any time previously since the end of 1880, when the first big flooding from the Great Spring was overcome. A broken pump was, however, restored at five miles four chains, which cleared the workings there of water and also dealt with flood water at the Marsh Shaft. The year closed with the Great Spring controlled by several head walls, but still awaiting an opportunity to work havoc upon the bold enterprise.

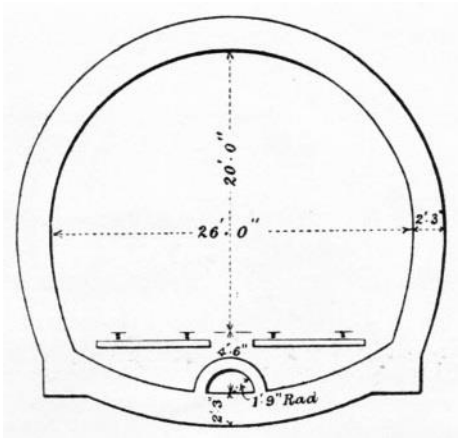
The minimum quantity of water then pumped was calculated at 23,000,000 gallons a day, and the maximum at about 30,000,000 gallons. Such a vast volume was sufficient to form in a year a lake 1,000 acres in extent and 30 ft deep. The total amount of water raised during the time the tunnel was under construction has been computed to equal a lake three miles square and 30 ft deep.

Another pump shaft had been sunk clear of the Monmouth face of the tunnel at six miles thirty-six chains, enabling all the rainfall from the open cutting then nearly finished (an area of about fourteen acres) to be raised with relatively low lift. On the English side the drainage of the cutting between Ableton Lane and the Gloucestershire end of the tunnel was conveyed into the tunnel, and dealt with by the Sea Wall pumps.

By the middle of the year two large pumping engines had been installed, one at Sudbrook and the other at five miles four chains, in readiness to take up work. The time had now

arrived for the attempt on the building of the tunnel under the Great Spring, whose potentiality for mischief had been well realized already by the builders.

To deal effectively with the Great Spring Sir John Hawkshaw drove a. side heading parallel with the tunnel from the Old shaft at Sudbrook, for the purpose of intercepting its flow. This side heading was extended till it reached a large open fissure in the strata which had formed the channel for the underground stream. The stream was then diverted into the side heading, and the tunnel left for the time being almost dry. Later, a new large shaft was sunk at the site of the tunnel, and six powerful pumps installed; in this way the Great Spring was permanently mastered.



A CROSS-SECTION of the tunnel, showing the chief dimensions, and the positions of the two sets of rails.

At the end of 1884 the whole of the tunnel was completed, except for a length of 200 yards just west of Sudbrook, and 500 yards of invert under the Shoots, where connexions remained to be made with the drains. On April 18, 1885, the last length of 143 yards of brickwork lining in the tunnel was finished. Altogether 76,400,000 bricks were used in the construction of the tunnel and bridges.

A good deal of work remained to be done in the open cuttings, especially on the English side. The laying of the permanent way, begun on October 22, 1884, was completed by the next year. The double track through the tunnel consisted of steel bridge rails of 68 lb to the yard, on longitudinal timbers, the remainder of the railway being formed of the then standard Great Western cross-sleeper track with 86 lb steel bull-head rails and 43 lb chairs.

The drainage of the tunnel generally (apart from the Great Spring) followed the original plan. It was provided for by constructing a semicircular arch 3 ft 6-in in diameter along the centre of the tunnel invert, the outside top of the drain thus formed being 4 ft 6-in below rail level. Gullies under the permanent way enabled the drainage water to pass into the central drain, which , ran the whole length of the tunnel. The water fell in both directions to the Shoots level, whence it passed into a 5-ft drain designed to lead the water to the pumps.

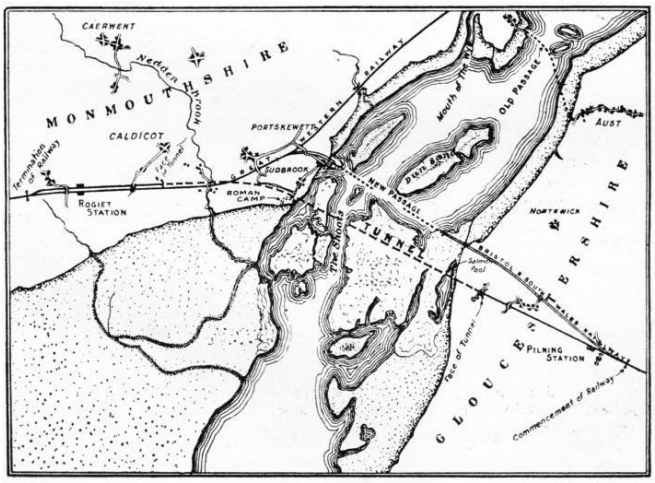
On September 5, 1885, the Chairman of the Great Western Railway Company, Sir Daniel Gooch, accompanied by Lady Gooch, and a party of friends, travelled in a passenger train from Severn Tunnel Junction through the tunnel to its Gloucestershire end and back.

Until this time the engineers confidently believed that the tunnel lining would withstand the pressure of water in the surrounding rock, and the sluice valve provided had been shut down on August 11. But events proved this confidence to be ill-founded. The increase of pressure which resulted from the damming of the water threatened disaster. Before the sluice valve was closed there was no pressure, but afterwards it soon rose to over 57 lb to the square inch. On the occasion of the visit referred to above, showers of water penetrated through the joints in the brickwork at several places. On December 20, when the highest pressure was recorded, the tunnel lining began to break, pieces flying off with loud reports, and water spouting right across the tunnel. It was then realized that the brickwork would never stand the enormous pressure, and that consequently a permanent plant was necessary capable of pumping the whole of the water of the Great Spring. Sir John Hawkshaw accordingly arranged for the sinking of an additional shaft of 29 ft internal diameter, or 35 ft, including the brick lining, opposite the tunnel at Sudbrook, to house this plant. Owing to the second eruption of the Great Spring into the lower heading north-west of the Old Shaft, it was found necessary almost to double the pumping power available.

The installation and inauguration of the permanent pumping plant signalized the completion of the structural work of the Severn Tunnel. The pumps have never wholly ceased their work since that time. The ventilating fan permanently provided at Sudbrook consisted of a large Guibal fan 40 ft in diameter and 12 ft wide, but this has since been replaced by a new fan.

On January 9, 1886, an experimental coal train ran from Aberdare to Southampton through the tunnel, with the result that coal was delivered at the port in the evening of the same day. The opening for traffic was delayed pending completion of the new pumping arrangements at Sudbrook, but on September 1, 1886, the line was opened for goods traffic. Passenger trains began to run between Bristol and Cardiff on December 1, 1886.

The total cost of the new line was £1,806,248. And the energy, enterprise, and bravery shown in this undertaking is as outstanding as any in the long account of human endeavour.



THE SEVERN ESTUARY, showing the line of the tunnel crossing, and also the Old Passage and New Passage ferries.

https://www.railwaywondersoftheworld.com/severn-tunnel.html

Consideration of Earthquake Aftershocks should be incorporated into Building Codes

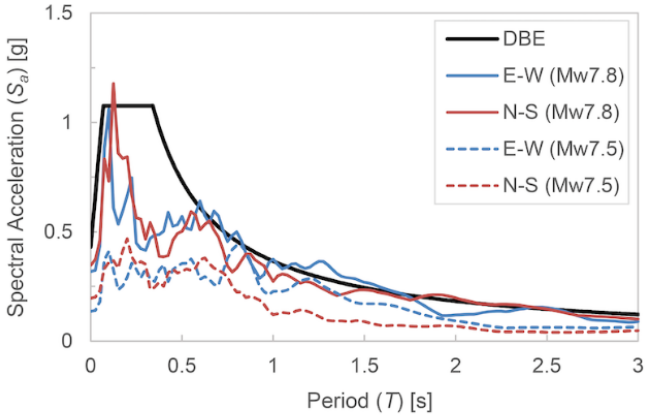
Dr. Subramanian

Building in Dogukent, Kahramanmaras which survived the first event but collapsed in the second earthquake (collapsed building in foreground of photo). (Ref. 7)

Observations from past earthquakes demonstrated that buildings in high seismic regions might be exposed to several aftershocks following the main-shock which can significantly increase the damage level. Since aftershocks have the potential to increase the vulnerability of buildings damaged under main shocks, it is crucial to consider aftershock effects in the structural design phase. During earthquake events, aftershocks have the potential to cause severe damage to buildings and threaten life safety even when only minor damage is present from the mainshock. While aftershocks are normally somewhat smaller in magnitude, their ground motion intensity is not always smaller. Aftershocks may have a higher peak ground acceleration than the mainshock, even longer duration, and significantly different energy content as a result of the change in their location relative to the site. To date, the description of seismic hazards in PBE has not included the probability of aftershocks.

Multiple earthquakes may cause additional damage to the structure, and as a result, it might bring significant social and economic losses. For instance, during the MW = 7.9 Wenchuan Earthquake (May 12, 2008), several aftershocks occurred after the main earthquake. This caused structural collapse and an increase in the structural damage of the buildings damaged by the mainshock [1]. During the MW7.1 earthquake in Christchurch (September 4, 2010) that occurred at the Greendale fault, the number of injuries was about 100 after the mainshock, while due to the MW 6.3 aftershock (February 22, 2011) occurred at the same fault, 185 people were killed [2]. Since the location and the time of occurrence, and the energy contents of aftershocks are not predictable, and due to their major effects on the building damaged by the mainshock, aftershocks can increase the damage level of structures or even lead to complete structural failure [3–5].

Türkiye is located in one of the most seismically active regions in continental Europe and the eastern Mediterranean. Three principal tectonic plates: Eurasian, African, and Arabian plates meet in Türkiye forming the Anatolian block. East Anatolian Fault rests at the boundary between the Anatolian block and the Arabian plate, which is located in southeast Türkiye extending over 500 km in length. On February 6, 2023, at 4.17 a.m. local time, a devastating earthquake occurred on the East Anatolian Fault. Within 9 h of time interval, the second one was triggered, 60 miles north of the first one, with a total fault rupture of about 120 miles. The first one with epicentral location in Pazarcık, Kahramanmaraş had a moment magnitude (Mw) of 7.8 according to USGS, and the second one in Ekinözü-Elbistan, Kahramanmaraş has a moment magnitude Mw of 7.5 according to USGS [6]. More than ten thousand aftershocks were recorded in the region within a month after the earthquakes. Two weeks after these major events on February 20, 2023, an independent Mw 6.4 earthquake occurred on the southern termination point of the East Anatolian Fault Zone (EAFZ). This earthquake having a focal depth of 21.73 km further influenced the Hatay region due its close epicentral distance located in Yayladağı-Hatay. The earthquakes together with numerous aftershocks killed more than 50,000 people and caused more than 200,000 buildings to collapse or be heavily damaged. 14 million people were affected and the financial loss was estimated at U.S. $100 billion, which amounted to nearly 10% of GDP in 2023. According to Zimmerman et al. (2023) a building in the city of Kahramanmaraş which had sustained damage but allowed everyone to evacuate during the first earthquake. Several residents had re-entered to search the buildings and collect belongings when the second major earthquake occurred nine hours later. The building collapsed completely killing those still inside.



Comparison of recorded spectra from the first and second event in the Kahramanmaras Earthquake Sequence (Mw 7.8 and Mw 7.5, respectively) versus the 2018 Turkiye Building Earthquake Code design-basis earthquake (DBE) for a site in Caglayancerit, Kahramanmaras (Ref. 7)

A magnitude 7.6 quake struck the west coast of Japan on Jan. 1st, 2024, destroying infrastructure and snapping power links to 22,000 homes in the Hokuriku region. The confirmed death toll reached 110 as of Jan. 6th, 2024 and the search for survivors in the rubble of collapsed buildings continues. More than 300 people are reportedly injured and 20 of them are in serious condition. Nearly 31,800 people are in shelters at the moment as tens of thousands of homes have been destroyed. Japan experienced more than 400 tremors until the morning of 3rd January and it is believed that the aftershocks are continuing as of today (6th Jan 2024) (Ref. 8)

Therefore, the effects of aftershocks can be considerable both in terms of structural damage and loss of lives. However, almost all seismic design codes neglect the impact of aftershocks in the structural design process and only consider the single earthquake effect. In the U.S., similar to Turkiye, the building code does not consider an explicit performance objective for multiple earthquakes in series.

Designing structures to withstand aftershocks is a crucial aspect of earthquake-resistant engineering. Some considerations for incorporating aftershocks into the design are given below:

1. Design Codes and Standards:

Unfortunately, there is no building code in any country that

has provisions or guidelines for considering aftershocks in structural design. References 9-11 provide some guidelines.

2. Seismic Hazard Analysis:

Anyway, a thorough seismic hazard analysis for the specific location should be conducted, where the structure is being built. This analysis should consider both the main earthquake and potential aftershocks.

3. Site-Specific Response Spectra:

Site-specific response spectra, to understand how the ground motion will affect the structure during both the main earthquake and aftershocks, may be used. This data helps in determining the forces that the structure needs to withstand.

4. Strength and Ductility:

Structures should be designed with sufficient strength and ductility to absorb the energy released during aftershocks. Ductility allows the structure to deform without catastrophic failure.

5. Redundancy and Load Path:

Redundancy should be incorporated into the structural system so that even if one element fails, there are alternative load paths. This helps prevent progressive collapse during aftershocks.

6. Foundation Design:

The foundation should also be designed to withstand aftershocks. This includes proper soil-structure interaction analysis and consideration of potential changes in soil properties due to the main earthquake.

7. Upgrade Existing Structures:

Existing structures, especially those in earthquake-prone areas, should be retrofitted and strengthened to better perform during the main shock and subsequent aftershocks.

8. Dynamic Analysis:

Dynamic analysis should be performed to assess the response of the structure to varying ground motions. This includes both linear and non-linear analyses to understand the behavior under different levels of seismic forces.

9. Seismic Isolation and Damping:

Seismic isolation devices and damping systems should be incorporated to absorb and dissipate seismic energy, reducing the impact of aftershocks on the structure. Seismic (base) isolation worked well in Turkiye and was found to be the best option for important structures such as acute-care hospitals in high seismic regions. It is because, of the approximately 100 seismically isolated buildings in Turkiye, eleven seismically isolated hospitals were within the affected region of the Kahramanmaraş and all performed very well, as compared to the significant structural damage or collapse exhibited by fixed-base buildings.

10. Regular Inspections and Maintenance:

Regular inspection and maintenance of structural elements should be implemented to identify and repair any damage or deterioration caused by the main earthquake or subsequent aftershocks.

11. Emergency Planning:

Emergency plans and evacuation procedures should be developed to ensure the safety of occupants in the event of aftershocks. People should be allowed to go inside buildings, only after thorough inspection of their safety.

Summary and conclusions

Recent earthquakes in several parts of the world, especially Turkey, have shown that there may be multiple earthquakes or aftershocks within a few hours. The structures damaged in the first earthquake are vulnerable to complete collapse during the subsequent earthquakes or aftershocks. Till now no building code in the world provides guidelines for the safety of structures when the buildings are subjected to multiple earthquakes within a few hours.

Designing structures to withstand aftershocks is a crucial aspect of earthquake-resistant engineering. Some considerations for incorporating aftershocks into the design are suggested. It has to be remembered that earthquake-resistant design is a complex and multidisciplinary process. Experienced structural engineers and other relevant experts should be consulted to design and detail structural elements to ensure that the design and detailing are adequately addressed to resist the potential impact of aftershocks. Careful detailing of joints is very important. Prequalified moment connections should be used in steel Special Moment Frames as per AISC codes.

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(Newsletter on LinkedIn, Random Thoughts in SE)

ΝΕΑ ΑΠΟ ΤΙΣ ΕΛΛΗΝΙΚΕΣ ΚΑΙ ΔΙΕΘΝΕΙΣ ΓΕΩΤΕΧΝΙΚΕΣ ΕΝΩΣΕΙΣ

International Society for Soil Mechanics and Geotechnical Engineering

ISSMGE News

www.issmge.org/news?page=1

ISSMGE Interactive Technical Talk Episode 13: Laboratory Stress Strain Strength Testing of Geomaterials (TC101)

ISSMGE IT Administrator / TC101 / 12-01-2024

The thirteenth episode of International Interactive Technical Talk has just been launched and is supported by TC101. Prof. David Airey, Prof. Irene Rocchi, Dr. David Reid and Prof. Erica Elice S. Uy are discussing with Dr. Marc Ballouz about "Laboratory Stress Strain Strength Testing of Geomaterials".

Watch ISSMGE Interactive Technical Talks

Geo-Engineers without Borders

ISSMGE IT Administrator / General / 18-01-2024

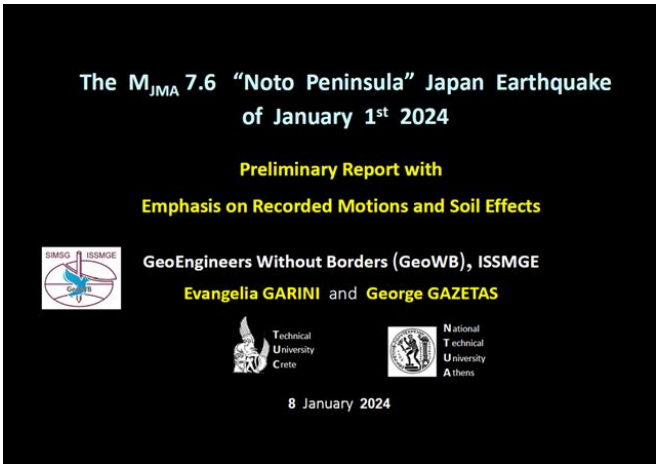
The ISSMGE "Geo-engineers Without Borders" new Committee (GeoWB) launched by President Marc Ballouz and managed by Pierre Delage with the help Daniela Pollak (Board member) aims at proposing to send volunteer geo-engineers from the ISSMGE worldwide network to areas affected by a geo-disaster (including earthquakes, landslides, floods, failure of dykes, dam and tailing dams, collapse of geotechnical structures). Volunteers will prepare a short comprehensive report for national and international authorities (travel expenses paid by the ISSMGE). Particular attention will be given to risk analysis and possible preventive measures.

Some GeoWB reports about geo-disasters can be found *here*. Further information on GeoWB can be found *here*.

Geo-Engineers Without Borders: Noto Peninsula January 1st 2024 Earthquake - First Preliminary Report

ISSMGE IT Administrator / General / 18-01-2024

ISSMGE Geo-Engineers Without Borders is happy to present (click here) the first preliminary report about a significant Mw 7.5 earthquake that struck near the Noto Peninsula in Ishikawa Prefecture, Japan on January 1, 2024.



The report was prepared by Evangelia Garini (Assistant Professor - Technical University of Crete, Greece) and George Gazetas (Professor - National Technical University of Athens, Greece).

12th International Conference on Scour and Erosion (ICSE 12) - First Announcement

Shinji Sassa / TC213 / 22-01-2024

The First Announcement for the 12th International Conference on Scour and Erosion (ICSE-12) is now available:

https://www.issmge.org/filemanager/article/1213/First_Announcement_ICSE-12_2025.pdf

Lecture "Current and future challenges for computational geomechanics" Prof. Jidong Zhao

Francesca Ceccato / TC103 / 23-01-2024

On January 22, the TC103 supporting committee of JGS held the TC103 seminar in Kyoto. The Lecture entitled Current and future challenges for computational geomechanics" was given by Prof. Jidong Zhao from Hong Kong University of Science and Technology during the period of his stay in Japan based on JSPS fellowship.

ISSMGE Board Announces Open Access Requirement for all its Publications

ISSMGE IT Administrator / General / 05-02-2024

ISSMGE has been advocating for open access technical material for many years as the wide availability of technical information can improve the quality of professional services,

the education of geotechnical engineers, promote research advancements, and impact the society at a global scale. To date, ISSMGE has strongly encouraged the availability of open-access proceedings for conferences under its Auspices and this has led to a significant growth in open-access papers in the geotechnical engineering field. In recent years, ISSMGE has been leading the geotechnical profession in open-access, in the following main ways:

- ISSMGE has developed an Online Library that makes available open access conference papers. The online library currently includes 17,088 papers from a total of 72 conference proceedings, including all conferences of the International Conference on Soil Mechanics and Geotechnical Engineering series published since 1936. In 2022 alone, these papers were downloaded from the ISSMGE Online Library 294,000 times.

- To further support open-access, ISSMGE developed in 2019 the Conference Paper Review Platform (CPRP), a platform that facilitates the review of abstracts and papers for conferences. The CPRP is available to everyone at no cost, as long as the papers are released in open access through the ISSMGE online library. Since its launch in 2019, the CPRP has been used by 11 conferences including several ongoing conferences.

- ISSMGE's journal, the International Journal of Geoengineering Case Histories, is a diamond open-access publication, i.e., all papers are published in the journal at no cost to the authors or the readers. In addition, data associated with the case histories are also accompanied by the papers in open access and are available in a geographic database. The average journal paper download for 2022, was 628 demonstrating the impact of the journal on the profession.

The Board of ISSMGE has decided that open access publishing for all ISSMGE conferences will be from now on required. The Board believes that adequate support and tools are provided by ISSMGE and/or other publishers that open access publishing for all ISSMGE conferences should no longer be strongly encouraged, but required. Thus, all ISSMGE-sponsored conference organizers are expected to make available the proceedings of their papers through open access and the ISSMGE online library.

In addition to this new policy, ISSMGE plans to continue to support the profession in making scientific information widely available. To that end, ISSMGE is establishing a new Board-level committee ISSMGE Committee on Publications. The committee will be responsible to maintain momentum in open-access, and support the publications of ISSMGE such as the International Journal of Geoengineering Case Histories journal, the Bulletin, and other publications. ISSMGE Board Member Prof. Dimitrios Zekkos has been appointed to oversee continued progress in that direction.

The President of ISSMGE

Marc Ballouz

ISRM International Society for Rock Mechanics and Rock Engineering

News
https://www.isrm.net

The 2023 ISRM Müller Lecture is now available 2024-01-19

The 2023 ISRM Müller Lecture, delivered by Prof. Derek Martin during the 2023 ISRM International Congress on Rock Mechanics, is now available through the ISRM website.

Click here to watch the 2023 ISRM Müller Lecture

73rd Geomechanics Colloquium 2024 2024-01-19

The Austrian Society for Geomechanics is pleased to invite you to the 73rd Geomechanics Colloquium 2024, to take place from 10 to 12 October 2024, at the Salzburg Congress, In Salzburg, Austria.

A call for papers is now on. Click here to acess the conference flyer.

The Geomechanics Colloquium will be preceded on 09.10.2024 by the 14th Austrian Tunnel Day.

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

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

Welcome to 2024 – The 50th Celebration Year of ITA-AITES 08 January 2024

This year we celebrate our contribution to the health, wealth and happiness of the peoples and environments of the world. ITA's relentless promotion safety and innovation through knowledge exchange, technological and industrial innovation has positively contributed to the development of safer and more robust underground development.

For half a century our contribution to knowledge development and exchange has contributed to safer, more resilient and increasingly robust clean water, drainage, sewerage, transportation, industrial, energy and security underground infrastructure solutions.

In this our 50th year the World needs the solutions we uniquely bring to the most pressing world crisis of health, productivity, environmental protection, peace and prosperity. We are uniquely burdened by the knowledge of our resilient and sustainable solutions – and must communicate these truths honestly and fearlessly – and then deliver on our promises when our solutions are adopted.

From new forms of contracting to advances in computational design and concrete, TBMs and digital models ITA is at the forefront.

Join us at WTC 2024 in April 2024, then join us again for the ITA awards celebration in November in Genova Italy!!

Enjoy our refurbished Website too – this is just the first phase of what will become a 100% renewed ITA virtual platform and social media presence for ITA!

2024 is ITA's 50 Year – Celebrate – you deserve it.

Arnold Dix, ITA-AITES President

ITA 50th Anniversary Photo Contest: Extended Deadline! 30 January 2024

ITA announces it will extend the deadline of the ITA Photo contest until February 9, 2024.

Here are some important reminders if you're planning to participate:

- The theme of the contest to celebrate ITA 50th Anniversary is **"Tunnels of yesterday and today – 1974-2024"**
- Participation is totally free
- Amateur and/or professional photographers can participate by presenting a series of photographs

The initiative aims to collect photographs regarding the tunnels and underground spaces built since the 1970's until the infrastructures being built now.

There are 3 different categories:

- Tunnels in operation
- Tunnels or underground spaces in construction
- Underground spaces

Download the regulations

- Download document
- Download document

Scooped by ITA-AITES #108, 2 January 2024

FAT celebrated for Bangkok Purple Line EPBM | Thailand

Tunnel king Deo Ca, S Korean firm to build two railway tunnels | Vietnam

Chongqing's underground world | China

Agra metro completes tunnelling for 6-km priority stretch, likely to open in february 2024 | India

HS2 reports that 90% of Chiltern tunnelling is near completion | UK

Major milestone for Borumba pumped storage project as Queensland Hydro releases two key tenders | Australia

Port link and Trans-Siberian tunnel inaugurated | Russia

The world's most impressive tunnel megaprojects

"Underground Library" Seamlessly blends with Japanese landscape

Future of Tunnelling | Greater focus on 'undervalued' high impact low probability events needed in risk management

Scooped by ITA-AITES #109, 17 January 2024

Proposal for the state budget 2024: Green light to put the ship tunnel out for tender | Norway

The proposed metro line for Dublin - Ireland

Tunnel boring machine Dinghai unveiled in Changsha | China

HS2 Project Update, January 2024 | UK

Sydney Metro West construction well under way | Australia

First underground robot delivery now active | USA

NEOM reveals 'upside-down', underground skyscraper in Saudi mountains | Saudi Arabia

TBM Shivaji of the Agra Metro lowered at RBS ramp | India

Construction begins on connection to the future Millennium Line platforms at Broadway–City Hall Station | Canada

Major construction project at Detroit Metro Airport begins: What to know | USA

Scooped by ITA-AITES #110, 30 January 2024

Lyon – Torino tunnel boring machine handed over | France - Italy

TBMs prepare for re-launch on Sydney Metro West | Australia

Inside Switzerland's Gotthard Base Tunnel 35-mile rail tunnel - the world's longest

Pedestrian Tunnel | Canada

This $15bn undersea tunnel changed Europe forever

Veligonda project second tunnel completed | India

Fehmarnbelt Tunnel | Denmark - Germany

Engineering firms investigate underground telescope feasibility | Netherlands, Belgium and Germany

HS2 project completes logistics tunnel at Old Oak Common Station | UK

MTA kicks off Second Avenue Subway Phase 2 project | USA

HS2 Area North An overview of activities at the Long Itchington Wood & Bromford Tunnels
Speaker: Guillaume Lefrere

Thursday 19th January 2023, Institution of Civil Engineers, 1 Great George Street, Westminster, London
https://www.youtube.com/watch?v=egghdw_tju8

In this presentation, Balfour Beatty VINCI will provide updates on two different tunnelling projects across HS2 Area North. The presentation will cover tunnelling activities at both the Long Itchington Wood Tunnel and the Bromford Tunnel.

2023 will be an important year for tunnelling at both sites, and the presentation will provide technical updates including the challenges faced by the tunnelling teams, innovate approaches used on site and some key learnings.

ΠΡΟΣΕΧΕΙΣ ΓΕΩΤΕΧΝΙΚΕΣ ΕΚΔΗΛΩΣΕΙΣ

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

ISGHS 2024 International Symposium on Geotechnical Aspects of Heritage Structures, 14-16 Feb 2024, Tiruchirappalli, India, www.isghs2024.in, www.igstrichy.org

IEMTA Southeast Asian Conference and Exhibition on Tunnelling and Underground Space 2024 (SEACETUS2024), 05 - 07 March 2024, Kuala Lumpur, Malaysia, https://submit.confbay.com/conf/seacetus2024

7th International Conference Series on Geotechnics, Civil Engineering and Structures (CIGOS), April 4-5, 2024, Ho Chi Minh City, Vietnam, https://cigos2024.sciencesconf.org

International Seminar on Successes and Failures: What did we learn? April 11, 2024, Copenhagen, Denmark, www.dfi-events.org/copenhagen2024

EGU General Assembly 2024 / Session NH9.6 - Natural hazards' impact on natural and built heritage and infrastructure in urban and rural zones, 14–19 April 2024, Vienna, Austria & Online, https://meetingorganizer.copernicus.org/EGU24/session/48709

ICGE-2024 - Fourth International Conference on Geotechnical Engineering-Iraq and WICES-2024 - Warith First International Conference of Engineering Sciences, 17-18th April 2024, Karbala, Iraq, https://wices.org

World Tunnel Congress 2024 19 to 25, April, 2024, Shenzhen China, www.wtc2024.cn

PILING AND FOUNDATIONS 2024, 23 April 2024, London, United Kingdom, https://piling.geplus.co.uk/2024/en/page/home

iCGE'24 International Conference of Geotechnical Engineering, April 25-27, 2024, Hammamet, Tunisia www.icge24.com

GEO AMERICAS 2024 5th Pan-American Conference on Geosynthetics Connecting State of the Art to State of Practice April 28 – May 1, 2024, Toronto, Canada, www.geoamericas2024.org

IFCEE 2024 International Foundation Congress and Equipment Expo, May 7–10, 2024, Dallas, USA https://web.cvent.com/event/c42dd622-dd91-409f-b249-2738e31c9ef5/summary

8th International Conference on Earthquake Geotechnical Engineering (8ICEGE), 7-10 May, 2024 Osaka, Japan, https://confit.atlas.jp/guide/event/icege8/top?lang=en

GeoShanghai 2024 International Conference on Geotechnical Engineering, May 26 – 29, 2024, Shanghai, China, www.geoshanghai.org

2nd annual Conference on Foundation Decarbonization and Re-use, May 28-30 2024, Amsterdam, The Netherlands, https://foundationreuse.com

IS-Macau 2024 11th International Symposium of Geotechnical Aspects of Underground Construction in Soft Ground, June 14-17, 2024, Macao SAR, China, https://is-macau2024.skliotsc.um.edu.mo

ISC'7 7th International Conference on Geotechnical and Geophysical Site Characterization "Ground models, from big data to engineering judgement", June 18-21, 2024, Barcelona, Spain, https://isc7.cimne.com

28th European Young Geotechnical Engineers Conference 2024, 25 to 29 June 2024, Demir Kapija, North Macedonia, https://eygec2024.net

WCEE2024 18th World Conference on Earthquake Engineering, June 30 - July 5, 2024, Milan, Italy, www.wcee2024.it

WCEE2024 18th World Conference on Earthquake Engineering, June 30 - July 5, 2024, Milan, Italy, www.wcee2024.it / Session SHR-7: When science meets industry: advances in engineering seismology stemming from engineering practice, olga.ktenidou@gmail.com

3rd ICPE 2024 Third International Conference on Press-in Engineering, 3-5 July 2024, Singapore, https://2024.icpe-ipa.org

EGRWSE-2024 5th International Conference on Environmental Geotechnology, Recycled Waste Materials and Sustainable Engineering, July 4-6th, Warsaw, Poland, https://iil.sggw.edu.pl/egrwse-2024

ICEC2024 SECOND INTERNATIONAL CONFERENCE ON EARTHEN CONSTRUCTION, 8-10 July 2024, Edinburgh, United Kingdom, https://icec2024.eng.ed.ac.uk, https://icec2024.sciencesconf.org

IS Landslides 2024 International Symposium on Landslides "Landslides across the scales: from the fundamentals to engineering applications" & IS Rock Slope Stability 2024, July 8-12th, 2024, Chambéry, France, www.isl2024.com

EUROCK 2024 ISRM European Rock Mechanics Symposium New challenges in rock mechanics and rock engineering July 15-19, 2024, Alicante, Spain, www.eurock2024.com

5th ICITG 5th International Conference on Information Technology in Geo-Engineering, August 5-8, 2024, Golden, Colorado, USA, https://learn.mines.edu/ICITG

S3: Slopes, Support and Stabilization, August 6-8, 2024, Aurora, Colorado, USA, https://s3.amazonaws.com/xcd-shared/dfi/Media/S324/2024-S3-CFA-20230807.pdf

ECSMGE 24 XVIII European Conference on Soil Mechanics and Geotechnical Engineering, 26-30 August 2024, Lisbon, Portugal, www.ecsmge-2024.com

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

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

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

4ο Συνέδριο Φραγμάτων
10 και 11 Σεπτεμβρίου 2024, Αθήνα
https://eemf.gr

Στο συνέδριο θα συζητηθούν τα ακόλουθα θέματα:

1. Ενέργεια - Αντλησιοταμίευση και Φράγματα
2. Κοινωνικά Θέματα / Ενημέρωση / Δημοσιά Εικόνα των Φραγμάτων
3. Καινοτομίες στο Σχεδιασμό, την Κατασκευή και την Παρακολούθηση Φραγμάτων
4. Αναβάθμιση Φραγμάτων: Ασφάλεια – Απόδοση
5. Λειτουργία - Συντήρηση και Διαχείριση Κρίσεων
6. Διαχείριση Υδάτινων Πόρων -Υδρολογία & Κλιματική Αλλαγή
7. Διαχείριση Ταμιευτήρων-– Πλημμυρών - Φερτών Υλών
8. Περιβαλλοντικός Σχεδιασμός Φραγμάτων

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

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

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

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

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

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

RMCC2023 1st International Rock Mass Classification Conference "Rock Mass Classification meets the Challenges of the 21st Century", 30-31 October 2024, Oslo, Norway, www.rmcc2024.com

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

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

3ο Διεθνές Συνέδριο Αρχαίας Ελληνικής και Βυζαντινής Τεχνολογία, 19-20-21 Νοεμβρίου 2024, Αθήνα, www.eda-byt.gr

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

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

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

World Tunnel Congress 2025 "Tunnelling into a sustainable future – methods and technologies", 9-15 May 2025, Stockholm, Sweden, www.wtc2025.se

Eurock 2025

ISRM European Rock Mechanics Symposium
Expanding the underground space -
future development of the subsurface
- an ISRM Regional Symposium
16–20 June 2025, Trondheim, Norway

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21st International Conference on
Soil Mechanics and Geotechnical Engineering
14 – 19 June 2026, Vienna, Austria

Organisers:

Austrian Geotechnical Society and Austrian Society for Geomechanics

Contact person: Prof. Helmut F. Schweiger
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ISFMG 2026 12th International Symposium on Field Monitoring in Geomechanics, August 2026, Indian Institute of Technology Indore, India, https://sites.google.com/view/isfmg2026/home

Eurock 2026

Risk Management in Rock Engineering - an ISRM Regional Symposium
14-19 June 2026, Skopje, R. N. Macedonia

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

Scope

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

- Fundamental rock mechanics
- Laboratory and field testing and physical modeling of rock mass
- Analytical and numerical methods in rock mechanics and rock engineering
- Underground excavations in civil and mining engineering
- Slope stability for rock engineering
- Rock mechanics for environmental impact
- Sustainable development for energy and mineral resources
- Petroleum geomechanics
- Rock dynamics
- Coupled processes in rock mass
- Underground storage for petroleum, gas, CO2 and radioactive waste
- Rock mechanics for renewable energy resources
- Geomechanics for sustainable development of energy and mineral resources
- New frontiers & innovations of rock mechanics
- Artificial Intelligence, IoT, Big data and Mobile (AICBM) applications in rock mechanics
- Smart Mining and Digital Oil field for rock mechanics
- Rock Engineering as an appropriate technology
- Geomechanics and Rock Engineering for Official Development Assistance (ODA) program
- Rock mechanics as an interdisciplinary science and engineering
- Future of rock mechanics and geomechanics

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

ΕΝΔΙΑΦΕΡΟΝΤΑ ΓΕΩΤΕΧΝΙΚΑ ΝΕΑ

Landslides from the 1 January 2024 Noto Peninsula Earthquake in Japan

Increasing amounts of information is becoming available about the landslides from the 1 January 2024 Noto Peninsula Earthquake in Japan. Initial reports indicate that there were over 1,000 slope failures: https://eos.org/theland-slideblog/noto-peninsula-earthquake-1

Image by Ikuro Aiba via The Asahi Shimbun

(Dave Petley, Jan 8, 2024, https://twitter.com/davepetley)

Landslides from the 1 January 2024 Noto Peninsula Earthquake in Japan

It is now clear that the Mw=7.5 triggered over 1,000 failures, causing extensive damage and disrupting the rescue effort.

National Route 249, a vital artery in the area of the Noto Peninsula Earthquake, is blocked by a landslide in Suzu, Ishikawa Prefecture, on 3 January. Image by Ikuro Aiba via The Asahi Shimbun

On 1 January 2024, the Mw=7.5 Noto Peninsula Earthquake struck the Ishikawa Prefecture in Japan. AS of the time of writing, 168 people are known to have lost their lives, whilst up to 323 are currently missing. A week after the event, there is little prospect of further survivors being found, but some of those reported missing may be safe elsewhere.

As expected from a reverse fault earthquake occurring just offshore a populated area, the earthquake triggered tsunami waves (fortunately of limited size) and building collapses. However, the earthquake has also triggered many substantial landslides (some reports indicate over 1,000, although this number will rise once a full inventory has been created), which have served to kill people directly and to hinder the rescue operations, most notably through the blockage of roads, increasing the loss of life from structural collapses.

The most dramatic image of these landslide is a video that has been widely posted to social media from Wajima. NBC has posted this to Youtube:-

https://www.youtube.com/watch?v=-WlMwMrm1uo&t=5s

Some early work has been undertaken to map the landslides triggered by the Noto Peninsula Earthquake. In the first instance, this is likely to be some of the larger failures. The Geospatial Information Authority of Japan has tweeted this map showing "slope failure locations and soil accumulation locations" – this data is also available online:-

There are some fascinating clusters of landslides, which will be interesting to understand. Two of these are located inland, but there is also a distinct cluster along the coast, where there are steep slopes that are likely to be out of equilibrium.

They have also posted aerial images online, with agreements that the data can be used and shared. There are some analyses already of the landslides shown in these images, some of which are startling:-

Meanwhile, there are some stunning images of the landslides triggered by the earthquake, including this one:

The caption describes this as "National Route 249 near Minamishimi in the city, which was cut off by a landslide."

(Dave Petley, 8 January 2024, https://eos.org/theland-slideblog/noto-peninsula-earthquake-1)

A landslide of contaminated soil threatens environmental disaster in Denmark. Who pays to stop it?

The area affected by a landslide of several millions tonnes contaminated soil is pictured, near the village of Oelst, near Randers, Denmark, Thursday Jan. 25, 2024. On Monday Prime Minister Mette Frederiksen said that "of course, it would be totally unfair if the children in Randers or elderly have to pay this bill", after visiting the site. (Bo Amstrup/Ritzaou Scanpix via AP)

COPENHAGEN, Denmark (AP) — Authorities in Denmark are working against the clock to stop a slow-moving landslide of contaminated soil from reaching a nearby water source as public officials and the company that operated the site argue over who should pay for the massive cleanup.

The 75-meter (250-foot) -tall heap of dirt at the Nordic Waste reprocessing plant south of the town of Randers in northwestern Denmark contains some 3 million cubic meters (100 million cubic feet) of soil contaminated with heavy metals and oil products. It is moving at a pace of up to 40 centimeters (16 inches) per hour toward a stream connected to the Baltic Sea via the Randers Fjord.

The landslide started Dec. 10. Nine days later, Nordic Waste gave up on getting it under control, leaving the task up to the Randers Municipality, which has been rerouting the stream by laying pipes allowing it to pass the site safely.

Environment Minister Magnus Heunicke said Friday that authorities are working on extending those pipes and that a sheet pile wall is being constructed, along with several basins for the contaminated water.

(Jan M. Olsen / AP, January 26, 2024, https://apnews.com/article/denmark-landslide-contaminated-soil-environment-04a82267b8ef4c3928220950fe05407a)

ΕΝΔΙΑΦΕΡΟΝΤΑ - ΓΕΩΛΟΓΙΑ

Massive tectonic collision causing Himalayas to grow may also be splitting Tibet apart

The Indian plate may be peeling into two as it slides under the Eurasian plate, tearing Tibet apart in the process.

(Image credit: donwogdo via Getty Images)

Tibet may be tearing in two beneath the rising Himalayas, with pieces of the continental plate peeling off like the lid off a tin of fish, researchers have discovered.

According to new research presented at the annual meeting of the American Geophysical Union and posted as a pre-peer-reviewed pre-print online, this shows that the geology beneath the world's highest mountain range may be even more complex than previously believed.

The Himalayas are growing because two continental tectonic plates, the Indian and Eurasian plates, are colliding beneath the colossal mountain range. In cases where oceanic and continental plates collide, the denser oceanic plate slides beneath the lighter continental plate in a process called subduction. When two similarly dense continental plates collide, however — as is the case below the Himalayas — it's not so simple to predict which plate will end up under the other, and geoscientists are still unsure exactly what's going on in Tibet.

Some suggest that the bulk of the Indian plate may simply be sliding under the Eurasian plate without diving deeply into the mantle, a process called underplating; others believe that perhaps deeper parts of the Indian plate are subducting, while the upper

The new research suggests that the answer could be both these explanations. The researchers found evidence that the Indian plate is subducting, but it's warping and tearing as it does so, with the upper half delaminating, or peeling away.

"We didn't know continents could behave this way, and that is, for solid earth science, pretty fundamental," Douwe van Hinsbergen, a geodynamicist at Utrecht University in the Netherlands, who was not involved in the work, told Science Magazine.

To get a clearer picture of what's happening below Tibet, the researchers investigated earthquake waves traveling through the crust at the region where the two plates collide. They reconstructed images from these waves showing what appear to be tears in the slab of the Indian plate's crust. In places, the bottom of the Indian plate is 124 miles (200 kilometers) deep, Science Magazine reported. In others, it is only 62 miles (100 km) to the bottom of the plate, suggesting some of it has peeled away.

Previous work, published in 2022 in the journal PNAS, also showed variations in the types of helium bubbling up from geothermal springs in the region. One variation of helium, known as helium-3, is found in mantle rocks, while helium with lower concentrations of helium-3 is likely to come from the crust. By mapping the variations in helium over multiple springs, the researchers found the boundary where the two plates currently meet just north of the Himalayas. The findings from these geochemical studies support the earthquake wave results in hinting at a splintering plate, the researchers wrote.

The new research may also point to areas of increased earthquake risk along the plate boundary, according to Science, though researchers don't yet fully understand how tearing and warping deep within the crust translates to the buildup of stress at the surface.

https://www.youtube.com/watch?v=6nnB3qQLdm0

(Stephanie Pappas / LIVESCIENCE, January 16, 2024, https://www.livescience.com/planet-earth/geology/massive-tectonic-collision-causing-himalayas-to-grow-may-also-be-splitting-tibet-apart)

Τα ηφαίστεια της Σαντορίνης και ο ρόλος του Ινστιτούτου Μελέτης και Παρακολούθησης Ηφαιστείου Σαντορίνης (ΙΜΠΗΣ)

Τα σημερινά ενεργά ηφαιστειακά κέντρα του εμβληματικού ηφαιστειακού νησιού της Σαντορίνης εντοπίζονται τόσο μέσα στην εντυπωσιακή καλδέρα της, Παλιά και Νέα Καμένη, όσο και εκτός στο υποθαλάσσιο ηφαίστειο Κουλούμπο. Το ΙΜΠΗΣ, ένας μη κερδοσκοπικός οργανισμός Ελλήνων Επιστημόνων και ανθρώπων του Νησιού, κυρίως της τοπικής αυτοδιοίκησης, με τη διαρκή υποστήριξη της, από την ίδρυση του πριν 30 χρόνια, παρακολουθεί και μελετά τη δραστηριότητα του ηφαιστείου. Τη σεισμική δραστηριότητα με ένα τοπικό δίκτυο σεισμογράφων, την ατμιδική με τις εκλύσεις αερίων (κυρίως υδρατμοί και ποσοστά διοξειδίου του άνθρακα, καθώς και ίχνη

μονοξειδίου του άνθρακα και υδρόθειου), τη στάθμη της θάλασσας με παλιρροιογράφους, τη διακύμανση της θερμοκρασίας (μέγιστη επιφανειακή 95°C), την εδαφική παραμόρφωση (ανυψώσεις-καταβυθίσεις) με τοπικό δίκτυο γεωδαιτικών σταθμών (GPS) και δορυφορικής γεωλογικής τηλεπισκόπησης. Ενημερώνει την τοπική κοινωνία και την Πολιτεία, επεξεργάζεται σχέδια έκτακτης ανάγκης και προστασίας του πληθυσμού.

ΗΦΑΙΣΤΕΙΑ ΣΑΝΤΟΡΙΝΗΣ Δευτέρα 15 Ιανουαρίου 2024, 9μμ. «Άνθρωπος και Φύση»

Σύνδεσμος παρακολούθησης (link):
https://www.youtube.com/watch?v=JDFVN4n1Oyo

Συνομιλούν: **Ζώρζος Νικόλαος**, Δήμαρχος Θήρας, Αντιπρόεδρος ΔΣ ΙΜΠΗΣ.

Βουγιουκαλάκης Γιώργος, Δρ Γεωλόγος-Ηφαιστειολόγος ΕΑΓΜΕ, Πρόεδρος ΔΣ ΙΜΠΗΣ

Κώστας Παπαζάχος, Καθηγητής Γεωφυσικής-Σεισμολογίας ΑΠΘ, Γραμματέας ΔΣ ΙΜΠΗΣ

Χαιρετισμό θα απευθύνει ο πρώην πρόεδρος του ΙΜΠΗΣ Ομοτ. Καθηγητής **Μιχάλης Φυτίκας.**

Τη συζήτηση συντονίζει ο **Σπύρος Β. Παυλίδης**, Ομότιμος Καθηγητής Γεωλογίας Α.Π.Θ., Μέλος ΔΣ ΙΜΠΗΣ, *Πρόεδρος ΔΣ Αριστοτελείου Μουσείου Φυσικής Ιστορίας Θεσσαλονίκης.*

Ελληνική Γεωλογική Εταιρία
Geological Society of Greece

Ετήσια Ομιλία "Γ. Μαρίνος - Ι. Παπασταματίου"

The Greek Mineral Resources Present Status, Current Trends and Proposed Future Plans

Στον παρακάτω σύνδεσμο μπορείτε να βρείτε την παρουσίαση του Ομ. Καθηγητή κ. Μ.Σταματάκη που δόθηκε στις 20/12/2023 στα πλαίσια της ετήσιας ομιλίας "Γ.Μαρίνος - Ι.Παπασταματίου"

https://drive.google.com/file/d/1gzEhsXAbJTFPIHjNdGyEdWdMQAoJ1rB8/view?usp=drive_link

Underwater Santorini volcano eruption 520,000 years ago was 15 times bigger than record-breaking Tonga eruption

A 500-foot-thick layer of pumice rock on the Mediterranean seabed indicates Santorini volcano ejected 15 times more material than Hunga-Tonga during a previously unknown eruption.

An illustration of the islands of the Greek archipelago of Santorini with the submarine volcano erupting. (Image credit: mikroman6 via Getty Images)

Deep beneath the Mediterranean seabed circling the Greek island of Santorini, scientists have discovered the remnants of one of the most explosive volcanic eruptions Europe has ever seen.

A giant layer of pumice and ash, which is up to 500 feet (150 meters) thick, revealed that around half a million years ago, the Santorini volcano erupted so explosively it was 15 times more violent than the Hunga Tonga-Hunga Ha'apai eruption of 2022. The Tonga eruption shattered several records, triggering the fastest atmospheric waves ever seen and the first known mega-tsunami since antiquity.

"We know that this volcano's had many big, explosive eruptions — sort of Krakatoa style," study lead author Tim Druitt, a professor of volcanology at the University of Clermont Auvergne in France, told Live Science. But the newly discovered deposits point to a cataclysmic blast "that we didn't even know had existed."

Extensive land-based research has previously painted a relatively detailed picture of past volcanism across the Hellenic Island Arc — a string of volcanic islands stretching from Greece to Turkey along a curved line where the African tectonic plate plunges beneath Europe. For instance, geologists knew that Santorini emerged from the sea about 400,000 years ago, as successive eruptions piled volcanic debris onto the seafloor. The present-day Santorini archipelago formed

during the Late Bronze Age (1600 to 1200 B.C.), when the explosive Minoan eruption blasted the top off what was then one island. A magma chamber beneath the Kameni islands, in the center of the Santorini caldera, still feeds the volcano today.

The JOIDES Resolution north of Santorini volcano (in the distance). The ship is a research deep-drilling vessel 460 feet (140 m) long and 200 feet (60 m) high. (Image credit: Thomas Ronge)

But there's only so much scientists can learn on land, Druitt said, because erosion from rain and wind wipes away some geological evidence. "That's why we moved to the marine realm, because in the sea it's calmer," he said.

To find out more about the region's volcanic activity, Druitt and his colleagues drilled into marine sediments around Santorini in late 2022 and early 2023. With help from the International Ocean Discovery Program, the researchers extracted sediment cores from up to 3,000 feet (900 m) below the seafloor at 12 drilling sites.

The team could then read the different layers of sediment "like a book," Druitt said.

"What you see is volcanic layers from all the eruptions that we knew on land," he said. "But then we go down to deeper levels before the volcano became emergent, when it was still submarine."

It's in these deeper levels that researchers discovered the remnants of a 520,000-year-old eruption that was "bigger than anything else Santorini's produced and probably one of the two biggest eruptions that the whole Hellenic volcanic arc has ever had," Druitt said.

Scientists examine core sections from the expedition. Each recovered core is 31 feet (9.5 m) long and is cut into sections 4.9 feet (1.5 m) long for handling. The sections are then sliced in half along their length for detailed description and collection of samples for further laboratory analysis. (Image credit: Tim Druitt)

The eruption ejected at least 21.6 cubic miles (90 cubic kilometers) of volcanic rock and ash, according to the study, published Jan. 15 in the journal Communications Earth & Environment. The Tonga eruption of 2022, by comparison, produced 1.4 cubic miles (6 cubic km) of debris.

"It's a lot bigger — 15 times bigger — there, in the heart of Europe," Druitt said.

The discovery is big because it shows that the Hellenic volcanic arc is capable of producing tremendous underwater eruptions. "It gives us an example to study in detail of a very large version of Hunga-Tonga," Druitt said.

Santorini probably won't see an eruption on this scale for another several hundred thousand years, Druitt said. The volcano last erupted in 1950, emitting lava that didn't pose a significant threat.

However, the magma chamber "will continue to feed eruptions of lava and small explosive eruptions for the coming decades and maybe even centuries," Druitt said.

(Sascha Pare / LIVESCIENCE, January 26, 2024, https://www.livescience.com/planet-earth/volcanos/underwater-santorini-volcano-eruption-520000-years-ago-was-15-times-bigger-than-record-breaking-tonga-eruption)

Giant offshore pumice deposit records a shallow submarine explosive eruption of ancestral Santorini

Tim Druitt, Steffen Kutterolf, Thomas A. Ronge, Christian Hübscher, Paraskevi Nomikou, Jonas Preine, Ralf Gertisser, Jens Karstens, Jörg Keller, Olga Koukousioura, Michael Manga, Abigail Metcalfe, Molly McCanta, Iona McIntosh, Katharina Pank, Adam Woodhouse, Sarah Beethe, Carole Berthod, Shun Chiyonobu, Hehe Chen, Acacia Clark, Susan DeBari, Raymond Johnston, Ally Peccia, Yuzuru Yamamoto, Alexis Bernard, Tatiana Fernandez Perez, Christopher Jones, Kumar Batuk Joshi, Günther Kletetschka, Xiaohui Li, Antony Morris, Paraskevi Polymenakou, Masako Tominaga, Dimitrios Papanikolaou, Kuo-Lung Wang & Hao-Yang Lee

Abstract

Large explosive volcanic eruptions from island arcs pour pyroclastic currents into marine basins, impacting ecosystems and generating tsunamis that threaten coastal communities and infrastructures. Risk assessments require robust records of such highly hazardous events, which is challenging as most of the products lie buried under the sea. Here we report the discovery by IODP Expedition 398 of a giant rhyolitic pumice deposit emplaced 520 ± 10 ky ago at water depths of 200 to 1000 m during a high-intensity, shallow submarine eruption of ancestral Santorini Volcano. Pyroclastic currents discharged into the sea transformed into turbidity currents and slurries, forming a >89 ± 8 km^3 volcaniclastic megaturbidite up to 150 m thick in the surrounding marine basins, while breaching of the sea surface by the eruption column laid down veneers of ignimbrite on three islands. The eruption is one of the largest recorded on the South Aegean Volcanic Arc, and highlights the hazards from submarine explosive eruptions.

Communications Earth & Environment **volume 5**, Article number: 24 (2024)

The moon is shrinking, causing landslides and moonquakes exactly where NASA wants to build its 1st lunar colony

The moon has been slowly shrinking for millions of years. Now, as Artemis 3 nears its 2026 launch date, geologists worry about whether moonquakes and lunar landslides will impact landing.

When plotting sites for crewed lunar landings — ranging from the forthcoming Artemis missions to eventual lasting moon settlements — mission planners must account for tons of lunar parameters. For instance, the shape of the terrain could make or break a mission and a possible high volume of buried water could make one spot much more tantalizing than its drier counterpart. But now, geologists suggest it's also important to keep moonquakes and lunar landslides in mind.

A photograph of the moon's surface. (Image credit: NASA)

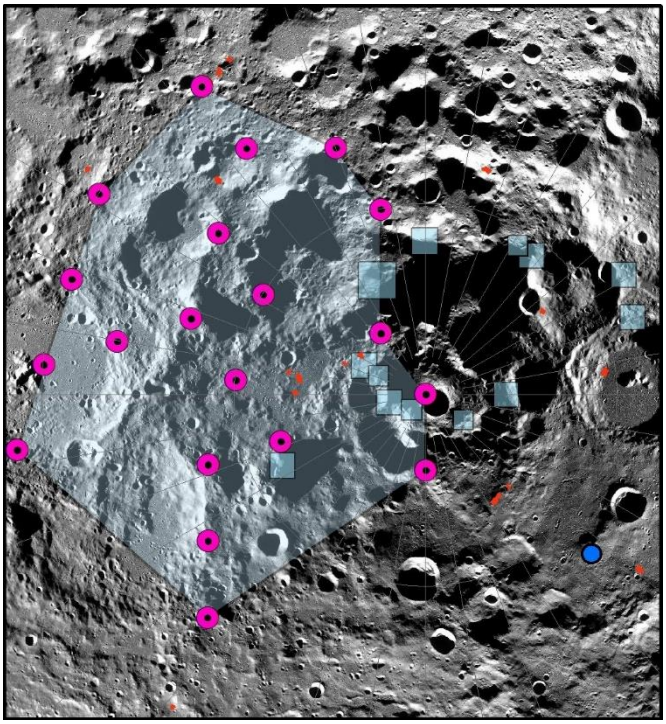
As the scientists emphasize, this is no longer an academic question. Researchers examining the moon's south polar region — which sits near the planned landing side of Artemis 3, set to touch down in 2026 — have identified fault lines whose slips triggered a major moonquake about 50 years ago.

Certain Apollo missions carried seismometers along with them. On March 13, 1973, a particularly strong moonquake rattled those seismometers from the general direction of the moon's south pole. Decades later, the Lunar Reconnaissance Orbiter flew over the south pole and discerned a webwork of fault lines. With new models, researchers have connected those faults with that moonquake.

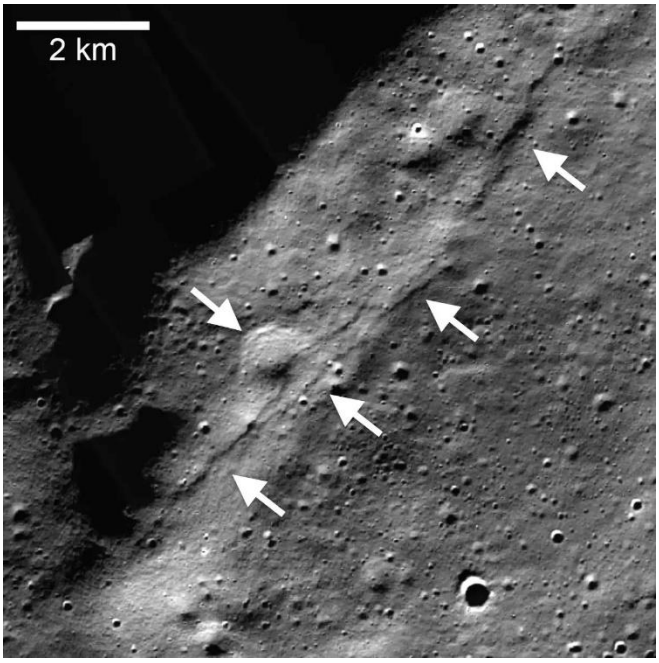
The research further adds to our picture of what moonquakes are like in general. In principle, moonquakes are like earthquakes. Both are caused by shifting faults; in the moon's case, they're caused by creases that form on the moon's surface as it shrinks. If you're asking yourself why in the world the moon would be shrinking, well, it's basically because the lunar interior has cooled over the last few hundred million years. It's sort of like a raisin shriveling up, scientists say, which also helps us visualize the creation of those creases.

Further, the moon's surface is much less tightly packed than Earth's, often consisting of loose particles that can be thrown up and strewn about by impacts. As a result, moonquakes are even more likely to trigger landslides than earthquakes are.

According to the researchers, as the day when human boots tread the moon yet again draws nearer, the humans in question will have to plan for the possibility that the ground under those boots is not as stable as they might hope. The researchers' model suggests, for example, that the walls of Shackleton Crater — famed for its ice — are vulnerable to landslides.



The epicenter of one of the strongest moonquakes recorded by the Apollo Passive Seismic Experiment was located in the lunar south polar region. However, the exact location of the epicenter could not be accurately determined. A cloud of possible locations (magenta dots and light blue polygon) of the strong shallow moonquake using a relocation algorithm specifically adapted for very sparse seismic networks are distributed near the pole. Blue boxes show locations of proposed Artemis III landing regions. Lobate thrust fault scarps are shown by small red lines. The cloud of epicenter locations encompasses a number of lobate scarps and many of the Artemis III landing regions. (Image credit: NASA/LROC/ASU/Smithsonian Institution)



A Lunar Reconnaissance Orbiter Camera, Narrow Angle Camera (NAC) mosaic of the Wiechert cluster of lobate scarps (left pointing arrows) near the lunar south pole. A thrust fault scarp cut across an approximately 1-kilometer (0.6-mile) diameter degraded crater (right pointing arrow). (Image credit: NASA/LRO/LROC/ASU/Smithsonian Institution)

"As we get closer to the crewed Artemis mission's launch date, it's important to keep our astronauts, our equipment and infrastructure as safe as possible," said Nicholas Schmerr, a geologist and one of the researchers, in a statement. "This work is helping us prepare for what awaits us on the moon — whether that's engineering structures that can better withstand lunar seismic activity or protecting people from really dangerous zones."

The research was published on Jan. 25 in The Planetary Science Journal.

Originally posted on Space.com.

(Rahul Rao / space.com, 30.01.2024, https://www.livescience.com/space/the-moon/the-moon-is-shrinking-causing-landslides-and-moonquakes-exactly-where-nasa-wants-to-build-its-1st-lunar-colony)

Tectonics and Seismicity of the Lunar South Polar Region

T. R. Watters, N. C. Schmerr, R. C. Weber, C. L. Johnson, E. J. Speyerer, M. S. Robinson and M. E. Banks

Abstract

The lunar south pole regions are subjected to global stresses that result in contractional deformation and associated seismicity. This deformation is mainly expressed by lobate thrust fault scarps; examples are globally distributed, including polar regions. One small cluster of lobate scarps falls within the de Gerlache Rim 2 Artemis III candidate landing region. The formation of the largest de Gerlache scarp, less than 60 km from the pole, may have been the source of one of the strongest shallow moonquakes recorded by the Apollo Passive Seismic Network. The scarp is within a probabilistic space of relocated epicenters for this event determined in a previous study. Modeling suggests that a shallow moonquake with an M_w of ~5.3 may have formed the lobate thrust fault scarp. We modeled the peak ground acceleration generated by such an event and found that strong to moderate ground shaking is predicted at a distance from the source of at least ~40 km, while moderate to light shaking may extend beyond ~50 km. Models of the slope stability in the south polar region predict that most of the steep slopes in Shackleton crater are susceptible to regolith landslides. Light seismic shaking may be all that is necessary to trigger regolith landslides, particularly if the regolith has low cohesion (on the order of ~0.1 kPa). The potential of strong seismic events from active thrust faults should be considered when preparing and locating permanent outposts and pose a possible hazard to future robotic and human exploration of the south polar region.

Published 2024 January 25 • © 2024. American Astronomical Society.
The Planetary Science Journal, Volume 5, Number 1 Results and Exploration of Lunar Science by the Lunar Reconnaissance Orbiter Mission **Citation** T. R. Watters *et al* 2024 *Planet. Sci. J.* **5** 22 **DOI** 10.3847/PSJ/ad1332

https://iopscience.iop.org/article/10.3847/PSJ/ad1332

ΕΝΔΙΑΦΕΡΟΝΤΑ - ΠΕΡΙΒΑΛΛΟΝ

The early September 2023 Daniel storm in Thessaly Region (Central Greece)

Δημοσιεύτηκε το τεύχος #30 του "**Newsletter of Environmental, Disaster, and Crises Management Strategies**", που εκδίδεται από το Π.Μ.Σ. "**Στρατηγικές Διαχείρισης Περιβάλλοντος, Καταστροφών και Κρίσεων**" του Εθνικού και Καποδιστριακού Πανεπιστημίου Αθηνών με τίτλο "**The early September 2023 Daniel storm in Thessaly Region (Central Greece)**". Στο τεύχος παρουσιάζονται συγκεντρωτικά τα πρώτα επιστημονικά δεδομένα από την κακοκαιρία "**Daniel**" που έπληξε την Περιφέρεια Θεσσαλίας σε πολλαπλά επίπεδα το Σεπτέμβριο του 2023

Πρόκειται για το αποτέλεσμα γόνιμης συνεργασίας και ανταλλαγής γνώσεων μεταξύ γεωλόγων, πολιτικών μηχανικών, γεωγράφων και ωκεανογράφων, που χαρτογράφησαν και παρακολούθησαν την κακοκαιρία "Daniel" και τις επιπτώσεις της στο φυσικό και δομημένο περιβάλλον, αλλά και σε πεδία της καθημερινότητας στο Θεσσαλικό Κάμπο και τις γύρω ημιορεινές και ορεινές περιοχές της Περιφέρειας Θεσσαλίας.

Το τεύχος εξετάζει το φαινόμενο, τις πολλαπλές επιπτώσεις του, τις δράσεις διαχείρισης έκτακτης ανάγκης και ολοκληρώνεται με **10 προτάσεις δράσεων για τη μείωση της διακινδύνευσης** από υδρομετεωρολογικούς και γεωδυναμικούς κινδύνους και το μετριασμό των επιπτώσεών τους.

Το τεύχος είναι διαθέσιμο **εδώ**. Σχετικό video είναι διαθέσιμο **εδώ**.

The 8 types of nature-based solutions for sustainable groundwater management

But first, do you know what "Nature-based Solutions" are? They're also known as NBSs.

In fact, they are actions that serve to protect ecosystems, restore them when necessary, and manage them sustainably. All this while ensuring human well-being and, above all, producing benefits for biodiversity.

In a new project, our teams are introducing this concept to groundwater management.

This is the SFN-ESO project.

Launched a few months ago, it has already clarified the links between these solutions and groundwater.

So, without further ado, here are the 8 types of NBSs that can be mobilized:

1 forests
2 agro-ecological practices
3 agro-ecological infrastructures
4 semi-natural grasslands
5 permeable green cities
6 wetlands
7 hydro-morphological restoration of rivers and streams
8 controlled recharge via vegetated basins

BRGM - The French geological survey

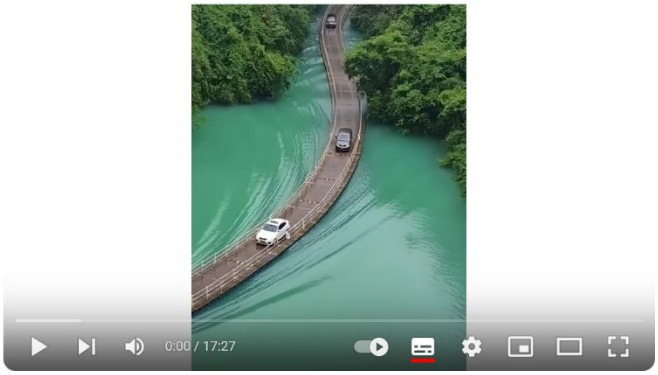
ΕΝΔΙΑΦΕΡΟΝΤΑ - ΛΟΙΠΑ

The Floating Bridge in China is one of the most beautiful bridges in the World

China is an expert when it comes to monumental works, often creating wonders which go on to become major tourist attractions. One such work is the wooden bridge over the Shiziguan river, which opened on May 1, 2016. Known as the "Long Bridge of Dreams", the spectacular walkway, spanning the river in central China, is surrounded by verdant greenery and already in many quarters it has been labeled the world's most beautiful wooden bridge.

It's 1,640 feet (500 metres) long and 4.5 meters wide, built over a dazzlingly winding turquoise river. The water depth is 60meters. The bridge follows the course of the **River Shiziguan**, which until now could only be navigated by boat. The walkway can be followed both up and downstream, and gives the visitor the feeling of walking on the river itself. This region, in the county of Xuan'en, is one of the **most inaccessible in China**, thus the bridge not only attracts much-needed tourists to the area, it also eases the locals' journeys.

The bridge was designed to be eco-friendly therefore natural materials were used in the building process. It is made up of 26 pontoon sections that are connected to each other via a locking system. The pontoons are made of steel and are filled with foamy materials to keep the bridge afloat. The locking system allows the bridge to accommodate the river currents and the weather conditions. Walking or driving on the bridge gives people an amazing sensation that they're moving on the water surface. The bridge also has a speed limit for cars to prevent big waves from forming.



The most dangerous floating bridge | Cars driving on water
https://www.youtube.com/watch?v=JBcqs3Nsqd4

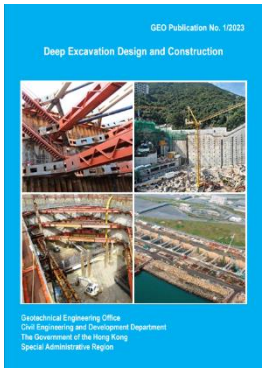
Those fortunate enough to have made the short trip across the bridge tell of the serenity they experienced whilst walking over the water, in a setting noted for its exuberant forests. One has only to contemplate pictures of the walkway over the **Shiziguan river** to understand just how stunning this wooden bridge is, and the importance of the work as a show-piece of Chinese engineering.

https://www.dangerousroads.org/asia/china/11199-driving-on-water-surface-through-the-shiziguan-floating-bridge.html

https://www.anticcolonial.com/en/naturelovers/the-most-beautiful-wooden-bridge-in-the-world/

https://themindcircle.com/the-floating-bridge/

ΝΕΕΣ ΕΚΔΟΣΕΙΣ ΣΤΙΣ ΓΕΩΤΕΧΝΙΚΕΣ ΕΠΙΣΤΗΜΕΣ



Deep Excavation Design and Construction

Report No.: GEO Publication No. 1/2023

This publication documented the experience in design and construction of deep excavations in Hong Kong since the publication of GCO Publication No. 1/90, including advances in design methods and modelling techniques, as well as the international practice of using the partial factor method for limit state design. The scope of this publication also covers the key aspects relating to the construction of excavation and lateral support (ELS) works, such as the introduction of modern equipment and digital construction.

Deep Excavation Design and Construction (7.05MB)

(Geotechnical Engineering Office / Civil Engineering and Development Department / The Government of the Hong Kong, 2023)

ΗΛΕΚΤΡΟΝΙΚΑ ΠΕΡΙΟΔΙΚΑ

ΕΛΛΗΝΙΚΗ ΕΠΙΤΡΟΠΗ ΣΗΡΑΓΓΩΝ ΚΑΙ ΥΠΟΓΕΙΩΝ ΕΡΓΩΝ

Μέλος της INTERNATIONAL TUNNELLING ASSOCIATION (ITA-AITES)

www.eesye.gr/uploads/1/2/2/2/12220305/deltio_2023_1_wtc2023.pdf

Κυκλοφόρησε το τεύχος Σεπτεμβρίου 2023 της Ελληνικής Επιτροπής Σηράγγων και Υπογείων Έργων με τα ακόλουθα περιεχόμενα:

- Νέα & Εκδηλώσεις
- Παγκόσμιο Συνέδριο Σηράγγων 2023 – Athens WTC2023
- Βιβλία – Νέες Εκδόσεις
- Επιστημονικές Συναντήσεις – Συνέδρια

INTERNATIONAL GEOSYNTHETICS SOCIETY

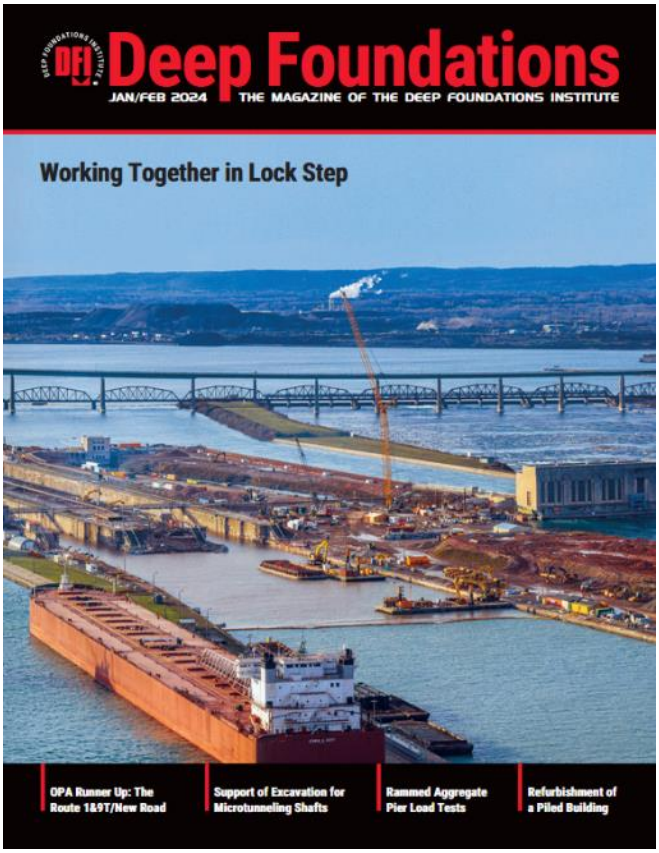
IGS NEWSLETTER – December 2023

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

Helping the world understand the appropriate value and use of geosynthetics

www.geosyntheticssociety.org/newsletters

- Could You Be An IGS Council Member? Call for Candidates: Term 2024 – 2028 READ MORE
- Students Apply Now For Free Entry To GeoAmericas 2024 READ MORE
- Corporate Members Invited to Showcase Projects at GeoAmericas2024 READ MORE
- Upcoming Webinars
  - Register Now For IGS Sustainability Calculator Webinar READ MORE
  - TC-Barriers Webinar by Richard Thiel READ MORE
- 10 Questions With… Kristin Sample-Lord READ MORE
- Boosting water safety and environmental wellbeing with geomembranes READ MORE
- IGS Corporate Member Profile: Istanbul Teknik
- Calendar of Events



www.nxtbook.com/dfi/DEEP-FOUNDATIONS/january-february-2024/index.php#/p/Intro

Highlights of the Jan/Feb Issue

- Cover Story: Working Together in Lock Step Read Now
- The Route 1&9T/New Road Read Now
- Bay Park Conveyance Project Read Now
- Rammed Aggregate Pier Load Test Results Read Now
- Refurbishment of a Piled Commercial Building Read Now
- Member Profile Read Now
- Foundations for a Sustainable Future Read Now
- Read Issue

ΕΚΤΕΛΕΣΤΙΚΗ ΕΠΙΤΡΟΠΗ ΕΕΕΕΓΜ (2023 – 2026)

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