Νησίδα Άγιος Ανδρέας βορειοδυτικά της Ζακύνθου

ΕΛΛΗΝΙΚΗ ΕΠΙΣΤΗΜΟΝΙΚΗ ΕΤΑΙΡΕΙΑ ΕΔΑΦΟΜΗΧΑΝΙΚΗΣ & ΓΕΩΤΕΧΝΙΚΗΣ ΜΗΧΑΝΙΚΗΣ

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Schanerloch Tunnel on the road from Dornbirn to the mountain village of Ebnit in Austria.

ΑΡΘΡΑ

Περισσότερες οι κατολισθήσεις την τελευταία δεκαετία στην Ελλάδα

Γιώργος Λιάλιος

Η χθεσινή στη Ζάκυνθο αναδεικνύει ένα επιδεινούμενο πρόβλημα – Ευρυτανία, ορεινή Θεσσαλία, Ηπειρος, Ηλεία, Αχαΐα και Εύβοια, οι περιοχές με τα μεγαλύτερα προβλήματα

Πλωτά μέσα ερευνούν για τυχόν αγνοουμένους στη διάσημη παραλία Ναυάγιο της Ζακύνθου, μετά την κατολίσθηση βράχων που σημειώθηκε εκεί στις 13 Σεπτεμβρίου 2018. [ΑΠΕ]

«Συναγερμό» στον κρατικό μηχανισμό προκάλεσε η κατάπτωση βράχων στον κόλπο του Ναυαγίου στη Ζάκυνθο, χθες το πρωί. Παρότι δεν υπήρξαν τραυματισμοί, η πρόσβαση στη διάσημη παραλία απαγορεύθηκε προσωρινά, ενώ ζητήθηκε έλεγχος της επισκεψιμότητας στον κόλπο, ώστε οι λουόμενοι να μην πλησιάζουν τα πρανή. Το χθεσινό περιστατικό –το οποίο συνδεόταν με σεισμική δόνηση– φέρνει στο προσκήνιο το ευρύτερο πρόβλημα της αύξησης των κατολισθήσεων, το οποίο συνδέεται άμεσα με την αύξηση των βροχοπτώσεων, άρα και την κλιματική αλλαγή.

Η αποκόλληση βράχων στα πρανή του κόλπου (όχι στην ακτή) σημειώθηκε έπειτα από σεισμική δόνηση 5,4 Ρίχτερ, με επίκεντρο ανάμεσα στη Ζάκυνθο και στην Κεφαλονιά. Το Λιμεναρχείο Ζακύνθου απαγόρευσε προληπτικά την αποβίβαση επισκεπτών στην ακτή, ενώ αργότερα πραγματοποιήθηκε σύσκεψη της Επιτροπής Τουριστικής Αξιοποίησης και Προστασίας του Ναυαγίου της Ζακύνθου. Κατά τη διάρκειά της αποφασίστηκε να γίνει εκ νέου σύσταση για αυστηρό έλεγχο της πρόσβασης των επισκεπτών μόνο στις επιτρεπόμενες ζώνες, με παράλληλη τήρηση του ανώτατου αριθμού επισκεπτών, ώστε οι λουόμενοι να μην πλησιάζουν στα πρανή του κόλπου.

Τα στοιχεία της ΕΑΓΜΕ

Το περιστατικό συνέπεσε με τη δημοσιοποίηση στοιχείων από την Ελληνική Αρχή Γεωλογικών και Μεταλλευτικών Ερευνών ΕΑΓΜΕ (πρώην ΙΓΜΕ) σχετικά με τα κατολισθητικά φαινόμενα στη χώρα μας την τελευταία διετία. Σύμφωνα, λοιπόν, με τα δελτία κατολισθήσεων που εκδίδει η ΕΑΓΜΕ για κάθε χρονιά:

• Το 2021 καταγράφηκαν 189 σοβαρά κατολισθητικά φαινόμενα. Η Περιφέρεια Δυτικής Ελλάδας επλήγη περισσότερο από κατολισθήσεις (ποσοστό 35,45%) και ακολουθούν οι Περιφέρειες Ηπείρου (15,34%), Θεσσαλίας (13,76%), Ιονίων Νήσων (10,58%) και Νοτίου Αιγαίου (8,99%), ενώ συγκριτικά λιγότερα φαινόμενα σημειώθηκαν στις Περιφέρειες Κρήτης (5,82%), Στερεάς Ελλάδας (4,23%) και Πελοποννήσου (2,65%) και πολύ μικρότερος αριθμός στις υπόλοιπες περιφέρειες της χώρας.

• Το 2020 καταγράφηκαν 312 σοβαρά κατολισθητικά φαινόμενα. Η περιφέρεια που επλήγη περισσότερο είναι αυτή της Θεσσαλίας, που συγκεντρώνει το 62,82% των καταγεγραμμένων κατολισθήσεων, ενώ ακολουθούν οι Περιφέρειες Κεντρικής Μακεδονίας με 11,54%, Στερεάς Ελλάδας με 7,69% και Ηπείρου με 5,77%.

• Οσον αφορά την τελευταία πενταετία, το 2018 καταγράφηκαν 343 κατολισθήσεις, το 2019 326, το 2020 312, το 2021 189, και εφέτος, από την αρχή της χρονιάς, 73 περιστατικά.

«Γενικότερα, την τελευταία δεκαετία παρατηρείται αύξηση των κατολισθητικών φαινομένων, που αποδίδεται στην ένταση των καιρικών φαινομένων λόγω μεταβολής του κλίματος» λέει ο κ. Διονύσης Γκούτης, γενικός διευθυντής της ΕΑΓΜΕ. «Οι περιοχές στις οποίες συμβαίνουν περισσότερες κατολισθήσεις είναι εκείνες όπου οι γεωλογικές συνθήκες τις διευκολύνουν: η Ευρυτανία, η ορεινή Θεσσαλία, η Ηπειρος, η Ηλεία, η Αχαΐα και η Εύβοια. Στην Ηλεία και την Εύβοια οι κατολισθήσεις έχουν επηρεαστεί και από τις μεγάλες πυρκαγιές, που κατέστρεψαν τη βλάστηση, γεγονός που οδήγησε σταδιακά στη χαλάρωση των εδαφών. Δεν λείπουν, βέβαια, οι περιπτώσεις στις οποίες τα κατολισθητικά φαινόμενα αυξάνονται εξαιτίας ανθρωπογενών παρεμβάσεων».

«Οι σοβαρότερες κατολισθήσεις φέτος έχουν σημειωθεί στην Αιτωλοακαρνανία, έπειτα από έντονες βροχοπτώσεις στα τέλη της προηγούμενης χρονιάς», εξηγεί ο κ. Νίκος Νικολάου, διευθυντής του τμήματος Τεχνικής Γεωλογίας της ΕΑΓΜΕ. «Ως αποτέλεσμα, πολλές παλιές κατολισθήσεις επανενεργοποιήθηκαν, ενώ εκδηλώθηκαν νέες σε πολλά χωριά των Δήμων Αγρινίου και Ναυπακτίας.

Οι ζημιές στην περιοχή είναι πολλές, τόσο στο οδικό δίκτυο, το οποίο είναι παλιό, όσο και σε σπίτια. Σε πολλές περιπτώσεις θα πρέπει να γίνουν ειδικές μελέτες για την κατεδάφιση σπιτιών, τη διάνοιξη δρόμων και την κατασκευή νέων τεχνικών έργων. Αρκεί να σας πω ότι πολλοί επαρχιακοί δρόμοι ανάμεσα στην Ευρυτανία και στην ορεινή Ναυπακτία είναι ακόμη κλειστοί».

Γνωστό φαινόμενο

Οσον αφορά την κατάπτωση βράχων στον κόλπο του Ναυαγίου στη Ζάκυνθο, πρόκειται για ένα φαινόμενο γνωστό. «Οι τελευταίες πτώσεις βράχων είχαν γίνει το 2018. Είχαμε πραγματοποιήσει αυτοψία και προτείναμε να απαγορευθεί εντελώς όχι μόνο η πρόσβαση στην παραλία, αλλά και η προσέγγιση σε απόσταση μικρότερη των 25 μέτρων από την ακτογραμμή», λέει ο κ. Νικολάου. «Οι λόγοι είναι πολλοί: τα πετρώματα εκεί, λευκοί ασβεστόλιθοι, είναι έντονα κατακερματισμένα, με μεγάλες κλίσεις. Στα πρανή έχουν δημιουργηθεί υποσκαφές εξαιτίας παλαιότερων καταπτώσεων. Επιπλέον, λόγω της διάβρωσης από τη θάλασσα, τις βροχοπτώσεις και τη σεισμική δραστηριότητα υπάρχουν μεγάλα κομμάτια έτοιμα να αποκολληθούν. Ζητήσαμε να αποκλειστεί και η θαλάσσια περιοχή, καθώς μια κατολίσθηση στη θάλασσα μπορεί να προκαλέσει έντονο κυματισμό και να απειλήσει τους κολυμβητές».

Το τμήμα Τεχνικής Γεωλογίας της ΕΑΓΜΕ έχει δημιουργήσει την Ομάδα Αμεσης Παρέμβασης, η οποία ενεργοποιείται έπειτα από σοβαρά κατολισθητικά φαινόμενα, μεγάλους σεισμούς ή άλλες φυσικές καταστροφές με γεωλογική αιτιολογία. Από το 2016, η ομάδα καλύπτει και τις ανάγκες της Γενικής Γραμματείας Πολιτικής Προστασίας, μεταβαίνοντας άμεσα στις πληγείσες περιοχές για εκτίμηση της επικινδυνότητας και παροχή οδηγιών προς τους αρμοδίους φορείς.

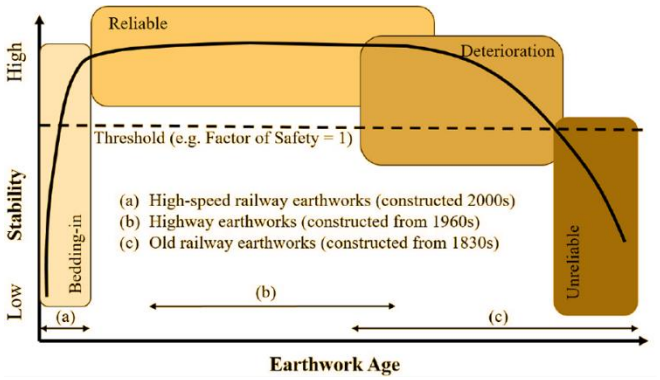
(Η ΚΑΘΗΜΕΡΙΝΗ, 09.09.2022,
https://www.kathimerini.gr/society/562034242/perissoteres-oi-katolisthiseis-tin-teleytaia-dekaetia-stin-ellada/)

Assessing the Deterioration of Ageing Infrastructure Earthworks

The ACHILLES Heel in Long, Linear Transport Networks

Kevin M. Briggs, Tom A. Dijkstra, and Stephanie Glendinning

Earthworks (embankments and cuts) are a major component of the physical infrastructure required to deliver critical transport and energy services over long distances. In the U.K., thousands of miles of earthworks support the strategic road and railway networks. This transport infrastructure includes some of the oldest railway earthworks in the world (c.1830s), many of which are cuts in high-plasticity clays and at various stages of deterioration. Some of this infrastructure is beyond the limit of the intended (or notional) design life and therefore requires targeted maintenance and renewal to maintain a safe and serviceable condition.



The cost of an earthwork failure is high and can act as an "Achilles' heel" to disrupt or disable traffic flow on a linear transport corridor. Earthwork slope failures are closely associated with seasonal weather events, such as prolonged winter rainfall and the resulting hydrological changes within the earthworks. Proactive, well-informed maintenance can significantly reduce the number of earthwork failures and the resulting long-term costs incurred by infrastructure owners. For example, emergency repairs of railway earthworks cost 10 times more than planned works, which in turn cost 10 times more than regular maintenance.

Over the past 20 years, a series of U.K. government-funded research projects (BIONICS, CLIFFS, FUTURENET, iSMART) have enabled collaboration between partner universities to explore the long-term deterioration of earthworks constructed in or from clay materials. These projects have included the instrumentation and monitoring of earthworks, numerical simulations of earthwork stability and material testing under laboratory-controlled conditions.

For the most recent research programme, ACHILLES brings together geotechnical engineers and statisticians to advance our understanding of earthwork deterioration processes and produce validated models that consider the time to failure for a route or network of earthworks.

Performance Curves

An inverted "bathtub" curve can be used to describe the deteriorating safety and serviceability of earthworks over their lifetime. This shows a measure of performance (e.g., slope movement, slope stability, or maintenance cost) of a single earthwork or multiple earthworks that form a transport route or network. Figure 1 shows a conceptual illustration of the changing stability of an earthwork over time. The curve shows that as an earthwork ages, it moves through stages of increased stability (e.g., the bedding-in stage), followed by consistent stability (e.g., the reliable stage), before reducing stability (e.g., the deterioration stage), and then stability below an acceptable threshold (e.g., the unreliable stage).

In the U.K. today, earthworks can be found at each stage of the curve. For example, new earthworks for the high-speed HS1 and HS2 railways are bedding-in, while older highways earthworks constructed in the 1960s are mostly at the reliable or deteriorating stages of stability. Most railway earthworks were constructed between 1830 and 1900, so their current stability can range from the reliable, to deteriorating, to unreliable stages. The cost of managing and maintaining these deteriorating and unreliable earthworks gradually increases as the frequency of maintenance activities increases, as does the likelihood of failures requiring emergency repairs.

Many earthworks in the U.K. and around the world will approach the deteriorating and unreliable stages in the next 50 years. Research in collaboration with infrastructure owners and their consultants is being used to understand the drivers of long-term earthwork deterioration. This research will inform infrastructure investment and identify the most at-risk earthworks for targeted maintenance and repair.

Earthwork Type	Railway Embankment	Highway Cut	Full-scale Trial Embankment	Flood Defence Embankment
Date of Construction	1887	1997	2005	2009
Slope Height (m)	5.5	8.0	6.0	3.0
Slope Gradient (V:H)	1:2.5	1:3.5	1:2	1:3 to 1:2.5
Material Type	Clay fill derived from high-plasticity clay	High-plasticity clay	Clay fill derived from intermediate-plasticity clay	Clay fill derived from intermediate-plasticity clay
Monitoring Duration	2006-2011	2002-present	2007-present	2021-present
Published Case Study	Smethurst et al., 2015	Smethurst et al., 2006	Hughes et al., 2009	N/A

Table 1. A summary of the ACHILLES field monitoring sites.

Long-term Field Monitoring Sites

It can be difficult to obtain long-term monitoring data from highway and railway earthworks that include repeated, seasonal weather cycles and the associated hydrological changes that drive deterioration. A key asset of the project is the number of fully instrumented earthworks that have been managed by the project team over many years with funding from successive research grants. The sites include a highway cut, a railway embankment, a flood-defence embankment, and a purpose-built, full-scale trial embankment with sections representative of both highway and railway slopes (Table 1).

These instrumented sites act as full-scale trials to compare the results of small-scale laboratory experiments with the behaviour of real earthworks. More critically, the instrumented sites provide validation datasets of up to 20 years for numerical simulations of earthwork deterioration. These simulations consider both historical weather conditions and forecasts of long-term behaviour. The instrumented sites provide key observations of earthwork geometry, material properties, and response to seasonal weather cycles that inform the subse-

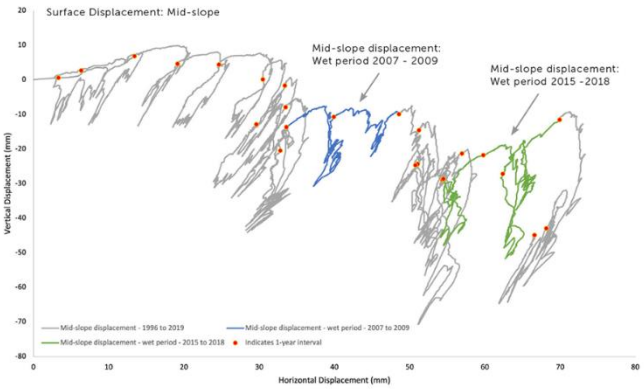
quent simulations and statistical analyses developed by the project team.

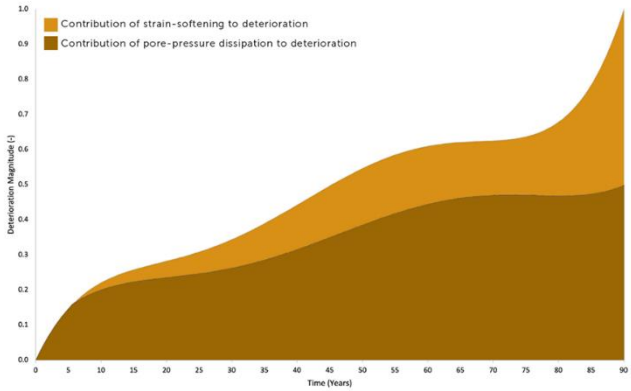
Emergency repairs of railway earthworks cost 10 times more than planned works, which in turn cost 10 times more than regular maintenance.

Forecasting the Deterioration of a Clay Cut

Geotechnical engineers are well aware that the stability of cut slopes in overconsolidated clays reduces over decades, as pore-water pressures equilibrate. However, it has been difficult to quantify the long-term influence of strain softening on the reduced stability of cut slopes driven by repeated, weather-induced pore-water pressure cycles.

To assess the influence of these factors, numerical simulations were used to examine and forecast the hydrology, displacement, and stability of an instrumented highway cut slope (Table 1) in a high-plasticity clay (i.e., PI > 30 percent). The simulations were validated against the slope's response to nearly 20 years of historic weather and were used to forecast its response to future weather conditions over a 90-year period. The simulations showed that seasonally driven pore-water pressure cycles drove ratcheting displacements and strain-softening in the cut slope over extended periods (Figure 2). The ratcheting displacements were particularly large following periods of wet winter weather. The simulations showed both a permanent reduction in shear strength due to ratcheting-induced strain-softening, and a temporary reduction in shear strength due to pore-water pressure changes (Figure 3). This explains the observation that many high-plasticity clay cuts can fail under wet winter conditions that are less onerous than in the past, when the slope remained stable.



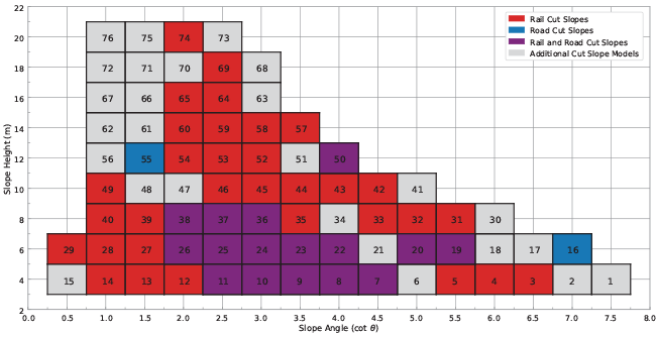


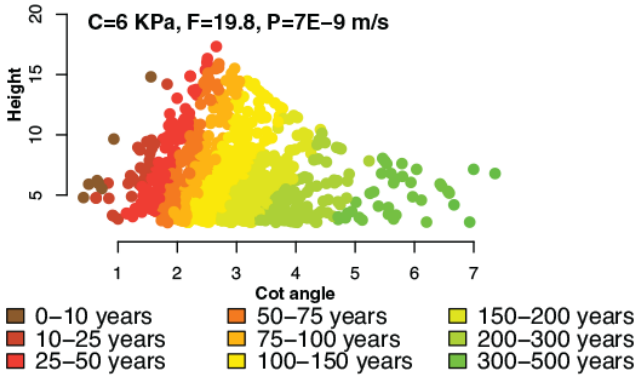
Forecasting the Deterioration of a Network of Cuts

Considerable computation time (days) is required to simulate the stability of a cut slope over many seasonal cycles. This is additionally difficult to complete for a range of slope geometries and material parameters that might be representative of cut slopes along a transport route or network.

A statistical emulator was used to make time to failure predictions for slopes with 900 combinations of five slope geometries and material parameters. These parameters were the slope height, slope angle, soil cohesion, soil friction angle, and soil permeability. A Latin hypercube design was used to investigate the influence of these five parameters on the time to failure, while running a minimal number of numerical simulations. The emulator used training data from 76 numerical simulations (Figure 4). This reduced the computation time to hours, from the decades that would be required to run the equivalent number of numerical simulations. The range of slope heights and angles in the emulator was chosen to be representative of those in a database of 1,432 high-plasticity clay cut slopes on the Great Western Railway and the M4 motorway (highway), between London and Bristol, U.K.

The model outputs showed the time to failure for different combinations of slope geometry, soil strength (cohesion, C, and friction angle, *F*), and permeability (*P*). The analyses showed that the time to failure was most sensitive to changes in the slope angle. For the soil parameters shown in Figure 5, the time to failure is consistent with documented cut slope failures in London Clay (a high- plasticity clay). Plots such as Figure 5 allow infrastructure owners and designers to estimate the likely duration of reliable earthwork performance and schedule proactive maintenance or replacement, where previously this was not possible. The statistical models are intuitive to use and consider simple predictors, but they're underpinned by rigorous numerical simulations that have been validated against long-term field monitoring data.





Rapid Assessment of Earthwork Condition

Infrastructure owners must be able to assess the current condition of their earthworks and detect the early stages of earthwork deterioration. Condition assessment is conducted during regular surveys, with instrumentation and warning systems installed at problematic sites that are deteriorating or becoming unreliable. Now they're moving toward rapid, above-surface deformation assessment of deteriorating

earthworks using technologies such as LiDAR surveys, or In-SAR (Interferometric Synthetic Aperture Radar) monitoring.

Within the ACHILLES team, a PRoactive Infrastructure Monitoring and Evaluation system, better known as PRIME, has been developed to image subsurface moisture distribution (to ~10-m depth) using electrical resistivity tomography. This is coupled with electrode displacement information showing surface deformation. The system has been installed at the long-term field monitoring sites (Table 1) and calibrated to detect moisture content changes within the subsurface of an earthwork, before they manifest as surface deformations and earthwork deterioration. Such subsurface measurements, coupled with an understanding of soil behaviour, can inform infrastructure owners of the early stages of earthwork deterioration and enable early, targeted maintenance or interventions.

Extending the Reliable Lifespan of Earthworks

Outputs from the numerical simulations are being examined by the project team's industrial advisory group, to aid decision making for infrastructure owners. They have been used to examine how the timing of slope remediation techniques can impact the serviceable life of an earthwork. For example, simulations of a high-plasticity cut showed that the installation of soil nails during the early stages of deterioration can maintain the stability of the earthwork and significantly increase the duration of reliable performance.

Embankments, Vegetation, and Climate Change ACHILLES researchers have created tools to forecast the time to failure of high-plasticity cuts located along the London-Bristol transport corridor. These can be adapted to consider ageing earthworks supporting transport networks in other locations and climates, where the relevant in-situ data has been gathered from monitoring sites.

Work is now continuing in ACHILLES to develop numerical simulations and associated statistical models for scenarios including (1) embankments, (2) earthworks constructed in intermediate plasticity clays, (3) earthworks with vegetation cover, and (4) forecasts driven by climate change projections. This will take time as data are gathered from the field monitoring sites, to then inform numerical simulations and forecasts of earthwork condition across a route or network.

Key Findings

The performance of transport infrastructure earthworks changes over their lifetime. Their performance is sensitive to physical and environmental loading over repeated cycles and long periods of time. Measures of earthwork performance can include, but are not limited to, considerations of safety (e.g., slope stability), serviceability (e.g., slope displacement or traffic surface deformation) or cost (e.g., the annual cost of earthwork maintenance and repair). Outputs from the ACHILLES research show that:

1. An understanding of deterioration processes in old (>100 years old) railway earthworks can be used to inform preventative maintenance and repair strategies for more modern highway and railway earthworks that will transition from reliable to deteriorating performance over the next 50 years.

2. Slope failures in deteriorated clay earthworks can occur during periods of wet weather that are less onerous than conditions during an earlier, reliable, stage of the earthwork's life. Field observations show that seasonal weather changes drive long-term pore-water pressure cycles within earthwork slopes. Simulations show that these can induce ratcheting displacements and material strain-softening in high-plasticity clay slopes. In the short- to medium-term, slope failure can occur due to the post-construction equilibration of pore-water pressures. Over time periods greater than 25 years, strain-softening can permanently reduce the strength of an earthwork and increase its susceptibility to failure during wet, winter weather.

3. Statistical models informed by numerical simulations of slope-scale deterioration can be used to forecast the time to failure of a route or network of earthworks. This can allow infrastructure owners and maintainers to reduce the cost and disruption of failures by prioritising interventions at targeted locations and at the optimal stage in the lifetime of an earthwork.

4. The life of an earthwork can be increased by detecting subsurface moisture movement though regular surveys or monitoring, and then intervening with remedial action during the early stages of deterioration. Interventions at the later stages of deterioration are likely to be more extensive, more costly, and less effective at extending the life of an earthwork.

Geotechnical engineers are well aware that the stability of cut slopes in over-consolidated clays reduces over decades, as pore-water pressures equilibrate. However, it has been difficult to quantify the long-term influence of strain softening on the reduced stability of cut slopes driven by repeated, weather-induced pore-water pressure cycles.

For further information on the ACHILLES programme, visit *achilles-grant.org.uk*.

https://www.readgeo.com/geostrata/august_september_2022/MobilePagedArticle.action?articleId=1809521#articleId1809521

Tunnel Failure Trends and Risk Management – further thoughts

Patrick Bravery, Chair of the International Tunnelling Insurance Group (ITIG) & Bill Newns, Director of Novoconsult

The article on the Tunnel Failure Trends and Risk Management published in the October/November issue of TJ triggered an interesting discussion and exchange of views and opinions between RULER Consult Directors, Spyros Konstantis and Panos Spyridis; Patrick Bravery, Chair of the International Tunnelling Insurance Group (ITIG) and; Bill Newns, Director of Novoconsult. The discussion is published here to ensure that the correct messages are shared with the construction insurance market and to raise awareness of the subject in the industry and within the ITA.

1) Patrick Bravery: I absolutely support your fundamental messages around ground investigation, design checking, construction supervision and robust risk management – these are important messages to reinforce in the market. Your paper helps to illustrate some broad patterns around tunnel failures, although of course we must guard against drawing simplistic conclusions from a data set that can never truly represent a highly diverse and multi-facetted industry sector.

However, I do have some questions on your analysis, the data, i.e. to also include the cases that didn't have issues. For example, Figure 2A shows that 27% of failure occur on Metro projects yet I suspect this sector is the most common in terms of number of projects/ length of tunnels built. Do you have the data to normalise the findings in this way and therefore offer a conclusion of the relative performance of the four sectors (Road, Metro, Rail, Hydro)? Similarly Figure 2B shows that 34% of failures occur on TBM projects yet this method is probably the most common measured by number and length of tunnels. Normalising the data should provide a measure of the relative performance of each construction method.

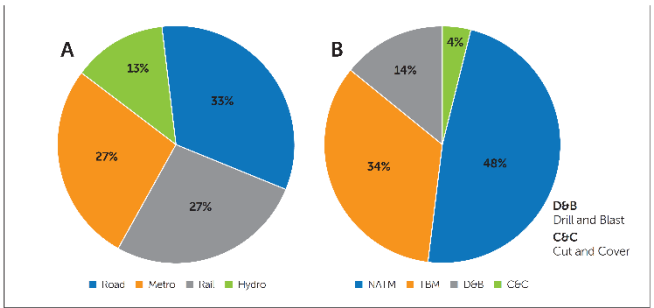


Figure 2. Type (left) and excavation technique (right) of tunnel failures during construction (Dallavalle, 2020)

Bill Newns: I agree the paper touches on important themes of sharing lessons learned to improve risk management although I share Patrick's concerns about over-simplification. I don't agree that there is an 'understanding deficit' - we can quite readily understand why something went wrong. Perhaps a data deficit is a better way of putting it and I understand that the ITA will be looking more closely into this – noting commercial sensitivities and I think we can all agree on that.

One gap in the paper for me is the acknowledgement that risk management starts at the planning stage with the client organisation. So many key decisions regarding risk management happen during the planning and reference design stage that are inherent by the time it comes to obtaining insurance, i.e.., within the hierarchy of controls they can't be eliminated. This principle is reflected in ISO31000 and the ITIG code and also the recent Health and Safety planning Guide issued by ITA WG5. This is perhaps a broader discussion on the 'quality' of the risks being brought to the insurance market and what I understand was behind the first (and subsequent) ITIG documents.

Ruler Consult: In our analysis we only used the publicly available data related to the recorded tunnel failure cases. We did not normalize the findings with all the constructed tunnels worldwide that did not have issues as this information does not currently exist in a comprehensive database. In the most relevant study provided by Spyridis and Proske ("Revised Comparison of Tunnel Collapse Frequencies and Tunnel Failure Probabilities" in press with the ASCE-ASME Journal of Risk and Uncertainty in Engineering Systems), an estimate was attempted for the total number of tunnels existing worldwide. This included the average tunnel length in some countries from which the total kilometre of driven tunnels could be roughly estimated, based for example on past construction industry trends and economic growth rates. However, the confidence level would not be high enough to draw definite conclusions, given all the uncertainties and assumptions involved. In addition, in the same study, there was no split between the different tunnel uses in order to estimate the relative performance of the four sectors during construction (road, metro, rail and hydro), taking into account their respective characteristics. We certainly agree that the contribution of the ITA and its country members would significantly assist in the direction of developing a comprehensive reference database. We would then be able to normalize the data accordingly and provide a measure of the relative performance of each construction method. Maybe a joint industry effort with the insurance market would be necessary in order to acquire consistent information of tunnels driven worldwide, including tunnel use, length, diameter, construction method, ground conditions, etc., but also the associated losses and schedule delays of the recorded tunnel failures and settled claims.

Such an action could cover the 'data deficit' issue. The 'understanding deficit' mentioned in the article, refers to the lack of publicly available information of the failures. Individual project stakeholders are of course well aware of what went wrong in a tunnel failure, but given the commercial sensitivities involved and the potential reputational repercussions, they show an increased reluctance in disseminating the root causes and proposing actions and measures that could have prevented the failure. Sharing lessons-learned does indeed take place but usually in in-house forums or informal discussions.

We agree that risk management must start at the very early project stages where most of the critical decisions are taken usually under conditions of uncertainty and it must be a continuous process throughout the project life cycle. Vital actions can be taken from the conceptual stage to operation, in order to mitigate, or even eliminate, construction failures and their consequences. In this regard, it is fundamental that the project owners and stakeholders cultivate a risk mind-set within their organisations and collaborate with industry experts to develop effective risk management frameworks for their projects.

2) Patrick Bravery: Figure 3 could be used to suggest that Sandstone is the 'riskiest' tunnelling medium (accounting for 22% of all failures). I am sure that is not your conclusion! Again, normalising the data for total number of projects or length of tunnel (broadly) in each ground would provide an indication of the relative risk of different ground conditions (although this analysis sits least comfortably with me, it is too tempting to link failure to ground conditions when so many other variables are at play).

Bill Newns: There is an old saying along the lines of 'good ground makes good contractors'… I agree with Patrick – this

figure over-simplifies the risks of ground conditions and moreover ground behaviour in relation to the tunnelling method. Does the project have a well-crafted GBR and what interaction occurred during the pre-tender phase in terms of what the parties agreed in terms of risk management. It would be interesting to see some metrics on the performance of GBRs but I understand CIRIA is undertaking a study currently to update the classic CIRIA 79 edited by Sir Alan Muir Wood.

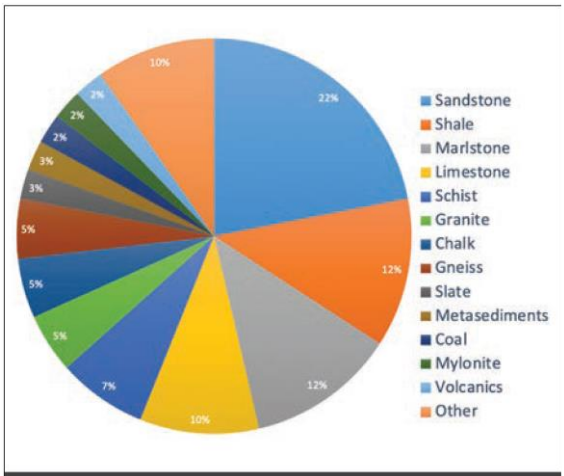


Figure 3. Prevailing ground conditions in the tunnel failure cases (Dallavalle, 2020)

Ruler Consult: The literature used to create the database allowed recording the geological formation that was present in the location where the tunnel failure occurred. Likewise, due to the absence of the overall relevant information for all the tunnels constructed worldwide without any issues, we could not normalize the findings.

When in soil type formations (typical for low overburden), failures are often due to the low geomechanical strength and deformability characteristics of the unit. In rock type formations (typical for higher overburden), the failures are usually to be attributed to the presence of weathered and weak zones, faults and local disturbed zones, bands with entrapped water under pressure, etc. From all the recorded cases, the highest percentage occurred in sandstone. Of course, this does not necessarily imply that tunnelling in sandstone has by nature a higher risk profile; neither should we directly link failure to ground conditions when so many other variables can have a significant contribution to a failure scenario. Until further data emerge, it could however be treated as motive for higher risk awareness when tunnelling through sandstone or similar geological formations.

We fully agree that the presence of a well-crafted GBR is essential to optimise contractual risk allocation practices, which is its principal purpose. GBRs definitely reinforce awareness among the key project stakeholders in the risk analysis, mitigation and control process, yet in some cases, they may fail to capture and baseline hydrogeological conditions leading to significant technical risks. One approach to reduce the risk profile of the project during tunnel construction could be that the GBR is subject to a controlled update and re-baseline as the real hydrogeological conditions are gradually revealed, following a rigorous risk based, but rather commercially cumbersome and complicated, change management process.

3) Patrick Bravery: The area of biggest interest to me is Figure 4, linking tunnel diameter to number of failures. I strongly suspect that the number of large TBMs (>13m diameter) is orders of magnitude below those in the 5 to 8m range and therefore the number of issues with large machines, as a proportion of the total in the ground, is hugely higher? It would be particularly helpful to normalise the data in this respect. Large diameter machines (or large face area tunnels) are pushing the boundaries of technology and challenging the fundamentals of physics (gravity, stress, pressure, force, torque etc) and therefore represent a higher inherent risk. The challenge is whether the risk mitigation you discuss in your paper can control these risks to an acceptable level. Recent loss experience on larger tunnels would suggest that more needs to be done here.

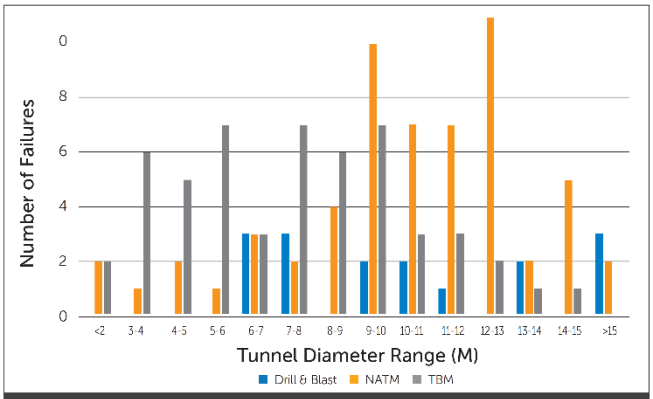


Figure 4. Number of tunnel failures per diameter range for different excavation methods

Bill Newns: I don't think there is enough data to draw any sensible conclusion yet, but I agree it would be useful to normalise the data as suggested. Whilst there is a general trend for larger machines in more extreme conditions and this is 'pushing the boundaries', the risk factors remain characterisation of geotechnical (and groundwater pressure) variability, machine design and machine operation and preparedness.

Ruler Consult: The data plot associating TBM diameters and tunnel failures frequency suggest that the number of TBM failures decreases with increasing diameter. This is most probably due to the fact that there is a fewer number of larger diameter TBMs operating worldwide in comparison to smaller diameters. We also pointed out that the larger the diameter, the higher the probability of face instabilities due to the bigger exposed face area and possibly due to mixed face conditions. It was emphasized that due to the much wider publicity that the large diameter TBMs are attracting and the higher financial and reputational consequences in case of a failure, these larger diameter machines may often receive higher attention in terms of risk management. Of course, this does not advocate that the larger diameter TBMs will be safer compared to the smaller diameter machines and a suitable level of attention should be devoted to these challenging and very often innovative cases.

4) Patrick Bravery: My final question relates to other sources of loss. While failure from collapse remains a major risk to any tunnelling project, our data clearly identifies water as by far the biggest source of loss activity and interestingly, and perhaps unexpectedly, water from external sources, i.e. rainfall run-off and flood. Does your data include any such events? I wonder if this observation is shared by others and how well this exposure is considered by the tunnelling community.

Bill Newns: I agree flood risks require detailed assessment. Defining what should be considered given climate change, is an interesting area of risk as the return periods get re-defined with more frequent extreme weather. For coastal works there is also the potential for storm surges and in seismically active countries, tsunamis.

Figure 6 highlights the dominant role of fire in terms of fatalities in operation. What about construction? The failure of fit-out elements is also presented as a significant source of fatalities. Be useful to know how many incidents are included

in that figure and what time after opening the incidents occurred. Are these or should these be addressed with inspection or maintenance? Refurbishing and re-purposing of tunnel assets is becoming more prominent – given its usually cheaper to upgrade a tunnel rather than build a new one (not necessarily less risk, do you have to keep it live and what condition is it in?) so it's happening more frequently and with increasing complexity and scale.

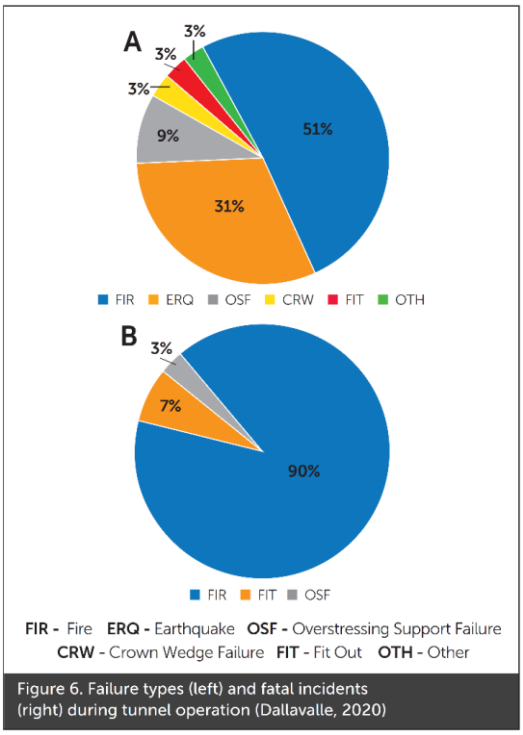


Figure 6. Failure types (left) and fatal incidents (right) during tunnel operation (Dallavalle, 2020)

To normalise the damage of operational tunnels from earthquakes with damage to all other adjacent buildings and infrastructure might be useful as there are many examples where tunnels have demonstrated their relative resilience. Such evidence supports the idea that they should be part of any lifeline infrastructure planning as a result - worthy of the additional capital investment of tunnelling in seismically active areas.

With reference to Figure 8 I would observe we still tend to focus on the tunnel excavations and the civil works but still underestimate the complexity of the fit-out for the end use with consequent potential for delay.

Ruler Consult: The presented data do not distinguish cases where the source of loss was ingress of external water, such as rainfall run-off and flood. We have recorded cases with notable water ingress, but these are related to a local failure or a generalized collapse at or close to the face area. The point raised in relation to losses attributed to water ingress from external sources is very important and is increasingly attracting the attention of tunnel project stakeholders, which we have also experienced.

With regards to the failure of fit out elements during the tunnel operation, such cases were only partially considered in the present analysis, since catastrophic events are scarce. We fully agree that further inspection and maintenance efforts should be focused on fit-outs to avoid catastrophic failures as well as interruptions of tunnel operation. A previous paper issued by Prof. Spyridis has discussed the topic of fixings in tunnels (Tunnels and Tunnelling, December 2018) and he is currently forming an international expert work group to provide further guidance for practitioners.

Given the nature of tunnels and their relative deformability with the surrounding geological environment, these structures are widely considered as resilient to earthquake events. Nonetheless earthquakes can when a fault is directly traversing the tunnel, due to increased ground deformations for shallow cut and cover tunnels, or due to ground liquefaction and increased uplift forces. We have also recorded some severe earthquake consequences for tunnels under construction. It would indeed be very interesting to compare the earthquake related risks of tunnels in comparison to at grade infrastructure, in order to verify the belief that tunnels and underground works are worthy of the additional capital investment of tunnelling in seismically active areas.

Figure 8 in the article, presents the monetary loss and the incurred time delay for projects which experienced a tunnel failure due to an insurable event only. It is true that fit out works for MEP and Systems installations in tunnelling projects and particularly in metro systems are very challenging and have caused significant delays in the project completion due to the their complexity and potential incompatibility with existing systems. A future analysis should extend its scope also to such events.

Acknowledgements

TJ and Ruler Consult would like to express its sincere thanks to Patrick Bravery and Bill Newns for their valuable insights and comments.

(Tunnelling Journal, February/March 2021, pp. 16-20))

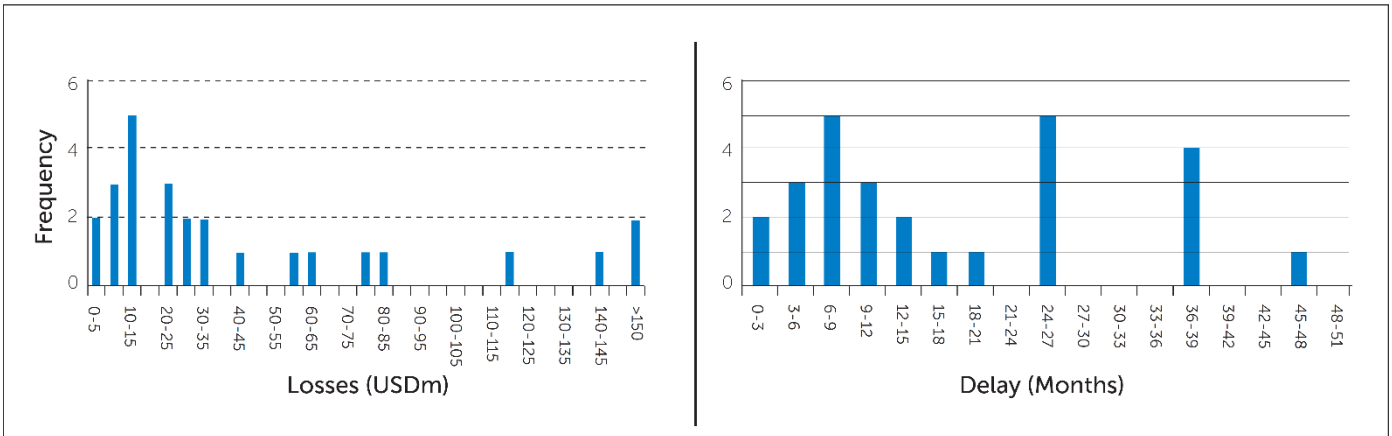


Figure 8. Frequency of insurance monetary loss (left) and schedule delays (right) due to tunnel failures (Konstantis, 2016)

ΝΕΑ ΑΠΟ ΤΙΣ ΕΛΛΗΝΙΚΕΣ ΚΑΙ ΔΙΕΘΝΕΙΣ ΓΕΩΤΕΧΝΙΚΕΣ ΕΝΩΣΕΙΣ

ΕΛΛΗΝΙΚΗ ΕΠΙΣΤΗΜΟΝΙΚΗ ΕΤΑΙΡΕΙΑ ΕΔΑΦΟΜΗΧΑΝΙΚΗΣ & ΓΕΩΤΕΧΝΙΚΗΣ ΜΗΧΑΝΙΚΗΣ

13η Αθηναϊκή Διάλεξη Γεωτεχνικής Μηχανικής Κυριαζής Πιτιλάκης

Ομότιμος Καθηγητής ΑΠΘ

Πρόεδρος Ευρωπαϊκής Ένωσης Σεισμικής Μηχανικής (ΕΑΕΕ)

Η 13η Αθηναϊκή Διάλεξη Γεωτεχνικής Μηχανικής είχε θέμα «Εξέλιξη των σεισμικών δράσεων σχεδιασμού στην Ελλάδα: Από τον χάρτη του 1955 στον προτεινόμενο νέο χάρτη σεισμικής επικινδυνότητας με νέους συντελεστές εδαφικής ενίσχυσης και νέα κατηγοριοποίηση των εδαφικών συνθηκών» και παρουσίασθηκε από τον Δρ. Κυριαζή Πιτιλάκη την Τετάρτη 14 Σεπτεμβρίου 2022 στην Κεντρική Αίθουσα του Συνεδριακού Κέντρου της Πανεπιστημιούπολης Αρχαίου Ελαιώνα του Πανεπιστημίου Δυτικής Αττικής.

Περίληψη

Μετά από μια σύντομη παρουσίαση της ιστορίας των σεισμικών δράσεων σχεδιασμού που υιοθετήθηκαν στους αντισεισμικούς κανονισμούς στην Ελλάδα από τη δεκαετία ήδη του 1950, η ομιλία ξεκινά με την αδήριτη ανάγκη βελτίωσης και αναθεώρησης του υφιστάμενου πλαισίου εκτίμησης των σεισμικών δράσεων σχεδιασμού, όπως επιβάλλεται και από τον υπό αναθεώρηση Ευρωκώδικα 8. Στη συνέχεια επικεντρώνεται στη μελέτη της σεισμικής επικινδυνότητας της χώρας με βάση τα αποτελέσματα μιας πολύ καλά τεκμηριωμένης μεθοδολογίας που αναπτύχθηκε πρόσφατα σε Πανευρωπαϊκό επίπεδο στο πλαίσιο των Ευρωπαϊκών Ερευνητικών προγραμμάτων SHARE και SERA, για να καταλήξει στην επεξεργασία και παρουσίαση μιας ολοκληρωμένης και επικαιροποιημένης πρότασης για έναν νέο χωρισμό της χώρας σε ζώνες μέσης ενιαίας τιμής των δύο παραμέτρων σχεδιασμού για το βασικό σενάριο με περίοδο επανάληψης 475 χρόνων, που είναι πλέον οι φασματικές τιμές επιτάχυνσης Sα,475 και Sβ,475 στο βραχώδες υπόβαθρο (V_s>800m/s), στην περιοχή του πλατώ και του 1.0s αντιστοίχως. Ο νέος αυτός χάρτης σεισμικής επικινδυνότητας φιλοδοξεί να αποτελέσει το εθνικό παράρτημα του υπό αναθεώρηση Ευρωκώδικα 8 και να αντικαταστήσει τον υφιστάμενο χάρτη του ΕΑΚ2003. Παράλληλα, και στο πλαίσιο πάντοτε του εκσυγχρονισμού του Ελληνικού αντισεισμικού κανονισμού ώστε να συμβαδίζει με τις εξελίξεις του Ευρωκώδικα 8 αλλά και άλλων σύγχρονων κανονισμών, προτείνεται μια νέα κατηγοριοποίηση των εδαφικών συνθηκών, που συνοδεύεται από την πρόταση νέων συντελεστών εδαφικής ενίσχυσης, οι οποίοι εξαρτώνται πλέον τόσο από την κατηγορία του εδάφους, όσο και από την ένταση του αναμενόμενου εδαφικού κραδασμού, έτσι ώστε να λαμβάνεται υπόψη η επιρροή της μη γραμμικής συμπεριφοράς των εδαφών σε έντονες σεισμικές διεγέρσεις. Η ομιλία θα ολοκληρωθεί με τη συζήτηση των επιπτώσεων που θα έχει ο νέος χάρτης σεισμικής επικινδυνότητας στη σεισμική διακινδύνευση της χώρας και ειδικά σε ό,τι αφορά στο κόστος των αναμενόμενων ζημιών του κτιριακού αποθέματος της Ελλάδος για το βασικό σενάριο του κανονισμού με μέση περίοδο επανάληψης 475 χρόνων, ή αλλιώς με πιθανότητα υπέρβασης 10% σε 50 χρόνια.

Σύντομο Βιογραφικό Κυριαζή Πιτιλάκη

Ο Ομότιμος Καθηγητής Κυριαζής Πιτιλάκης είναι απόφοιτος του Αριστοτελείου Πανεπιστημίου Θεσσαλονίκης (ΑΠΘ), διδάκτωρ της Ecole Centrale de Paris και τρέχων πρόεδρος (2018 -) της Ευρωπαϊκής Ένωσης Αντισεισμικής Μηχανικής (ΕΑΕΕ, www.eaee.org). Διετέλεσε Πρόεδρος του Τμήματος Πολιτικών Μηχανικών του ΑΠΘ, του Ινστιτούτου Τεχνικής Σεισμολογίας και Αντισεισμικών Κατασκευών (ΙΤΣΑΚ), της Τεχνικής Επιτροπής "Earthquake Geotechnical Engineering and Associated Problems" (TC203) της Διεθνούς Ένωσης Εδαφομηχανικής και Γεωτεχνικής Μηχανικής (ISSMGE www.issmge.org), και του Ελληνικού Τμήματος Αντισεισμικής Μηχανικής (ΕΤΑΜ) (www.eltam.org). Από το 2019 είναι επισκέπτης καθηγητής στο Tongji University, Shanghai-China, στο International Joint Research Laboratory of Earthquake Engineering (ILEE). Το εργαστήριο το οποίο έχει δημιουργήσει με τους συνεργάτες του στο Αριστοτέλειο Πανεπιστήμιο είναι από τα σημαντικότερα στο αντικείμενο του στην Ελλάδα και την Ευρώπη, με σύγχρονο εξοπλισμό και πλούσιο ερευνητικό και εφαρμοσμένο έργο στην εδαφοδυναμική, την γεωτεχνική μηχανική και την σεισμική μηχανική (http://sdgee.civil.auth.gr). Έχει συντονίσει και συμμετάσχει ενεργώς σε πλήθος σημαντικών Ευρωπαϊκών και Εθνικών ερευνητικών προγραμμάτων. Μεταξύ των πλέον εμβληματικών ερευνητικών του έργων είναι η δημιουργία και η συνεχής από το 1995 λειτουργία του ερευνητικού πεδίου δοκιμών EUROSEISTEST (http://euroseisdb.civil.auth.gr) όπως και ο συντονισμός του ερευνητικού προγράμματος SYNER-G (www.syner-g.eu) που αποτέλεσε τομή στην Ευρώπη και διεθνώς στην σεισμική τρωτότητα κατασκευών, δικτύων και τεχνικών έργων υποδομής. Εξίσου σημαντικές είναι και οι διάφορες διεθνείς του δραστηριότητες, όπως επί παραδείγματι η διοργάνωση στην Θεσσαλονίκη του 4ου Διεθνούς Συνεδρίου Γεωτεχνικής Σεισμικής Μηχανικής (4ICEGE) (2007) και του 16ου Πανευρωπαϊκού Συνεδρίου Σεισμικής Μηχανικής (2018) (www.16ecee.org), καθώς και άλλων συνεδρίων και σεμιναρίων στο εξωτερικό. Το πλούσιο συγγραφικό του έργο (h-index 56) περιλαμβάνει περίπου 700 επιστημονικές δημοσιεύσεις σε επιστημονικά περιοδικά, πρακτικά διεθνών συνεδρίων και βιβλία, που καλύπτουν ένα ευρύ φάσμα αντικειμένων στην γεωτεχνική και σεισμική μηχανική, την εδαφοδυναμική, την τεχνική σεισμολογία και την σεισμική διακινδύνευση τεχνικών έργων. Διαθέτει πλούσια επαγγελματική εμπειρία στην Ελλάδα και το εξωτερικό σε σημαντικά τεχνικά έργα, και στην σύνταξη αντισεισμικών κανονισμών, του Ευρωκώδικα 8 συμπεριλαμβανομένου. Το βιβλίο του «Γεωτεχνική Σεισμική Μηχανική», που είναι το μοναδικό στην Ελληνική βιβλιογραφία και τα τέσσερα βιβλία που εξέδωσε στον εκδοτικό οίκο Springer σε θέματα σχετικά με την σεισμική μηχανική, την γεωτεχνική σεισμική μηχανική και την σεισμική τρωτότητα κατασκευών, συνέβαλαν στην πρόοδο της επιστήμης στα συγκεκριμένα αντικείμενα. Διετέλεσε και είναι μέλος πολλών επιστημονικών επιτροπών συνεδρίων και συντακτικών επιτροπών επιστημονικών περιοδικών, κριτής πλήθους επιστημονικών περιοδικών διεθνούς εμβέλειας και αξιολογητής ερευνητικών προγραμμάτων, ερευνητικών έργων και μελετών σημαντικών τεχνικών έργων στην Ευρώπη και διεθνώς. Έχει προσκληθεί ως κύριος ομιλητής σε πλήθος εθνικών και διεθνών συνεδρίων. Φοιτητές του κατέχουν σημαντικές ακαδημαϊκές θέσεις και θέσεις ερευνητών σε πολλά πανεπιστήμια και ερευνητικά ινστιτούτα στην Ελλάδα και το εξωτερικό. Για τη συνολική του συνεισφορά στην επιστήμη τιμήθηκε το 2007 από την Γαλλική Δημοκρατία με το παράσημο του Ιππότη του Φοίνικα των Ακαδημαϊκών Γραμμάτων (Chevalier dans l'Ordre des Palmes Academiques).

ΕΛΛΗΝΙΚΗ
ΕΠΙΣΤΗΜΟΝΙΚΗ
ΕΤΑΙΡΕΙΑ
ΕΔΑΦΟΜΗΧΑΝΙΚΗΣ
& ΓΕΩΤΕΧΝΙΚΗΣ
ΜΗΧΑΝΙΚΗΣ

Η Ελληνική Επιστημονική Εταιρεία Εδαφομηχανικής & Γεωτεχνικής Μηχανικής (ΕΕΕΕΓΜ) διοργάνωσε την Ημερίδα «Γεωτεχνική Μηχανική & Σχεδιασμός Οδοστρωμάτων» την Τετάρτη 28 Σεπτεμβρίου 2022 στο Συνεδριακό Κέντρο της Πανεπιστημιούπολης Αρχαίου Ελαιώνα του Πανεπιστημίου Δυτικής Αττικής.

Πρόγραμμα Ημερίδας

1η Συνεδρία: Αρχές & Κανονισμοί Σχεδιασμού

2η Συνεδρία: Έρευνα πεδίου και εργαστηρίου για την κατασκευή νέων και την ανακατασκευή υφιστάμενων οδοστρωμάτων

3η Συνεδρία: Ειδικά Θέματα - Πραγματικά Περιστατικά

SIMSG ISSMGE

International Society for Soil Mechanics and Geotechnical Engineering

ISSMGE News & Information Circular September 2022
www.issmge.org/news/issmge-news-and-information-circular-September-2022

1. PRESIDENTIAL REPORT JUNE 2022

The President of the ISSMGE, Dr Marc Ballouz, has prepared a short video report on his activities during June 2022, available from https://www.youtube.com/watch?v=FGZLafq77Ow.

2. ISSMGE INTERACTIVE TECHNICAL TALKS: A NEW EDUCATIONAL INITIATIVE BY THE PRESIDENT OF ISSMGE

The President of ISSMGE Dr. Marc Ballouz has just launched a new educational initiative titled ISSMGE Interactive Technical Talks (IITT). It represents a series of technical talks to bring together geo professionals from around the world, young and renowned, from both the academia and the industry, to discuss a certain subject of geotechnical engineering. For more information and to view the first episode please go to https://www.issmge.org/news/issmge-interactive-technical-talks-a-new-educational-initiative-by-the-president-of-issmge.

3. ISSMGE BULLETIN

The latest edition of the ISSMGE Bulletin (Volume 16, Issue 4, August 2022) is available from the website.

4. ISSMGE FOUNDATION

The next deadline for receipt of applications for awards from the ISSMGE Foundation is the 30th September 2022. Click **here** for further information on the ISSMGE Foundation.

5. CONFERENCES

For a listing of all ISSMGE and ISSMGE supported conferences, and full information on all events, including deadlines, please go to the Events page at https://www.issmge.org/events. However, for updated information concerning possible changes due to the coronavirus outbreak (ie. postponements, cancellations, change of deadlines, etc), please refer to that specific events website.

As might be expected, many events have been rescheduled and we update the Events page whenever we are advised of changes.

The following are events that have been added or amended since the previous Circular:

ISSMGE EVENTS

16TH INTERNATIONAL CONFERENCE ON GEOTECHNICAL ENGINEERING [PHYSICAL + ONLINE] - 07-08 DECEMBER, 2022 Civil Engineering Department, University of Engineering and Technology (UET) Lahore, Pakistan; Language: English; Organiser: Pakistan Geotechnical Engineering Society (PGES); Contact person: Dr. Jahanzaib Israr, Associate Professor of Civil Engineering Address: Civil Engineering Department, University of Engineering and Technology (UET) Lahore, Pakistan; Phone: 03344132808 ; Email: 16icge@uet.edu.pk; Website : https://16icge.uet.edu.pk/

17TH ASIAN REGIONAL GEOTECHNICAL ENGINEERING CONFERENCE - 14-08-2023 - 18-08-2023 Nur-Sultan, Kazakhstan, Language: English; Organiser: Kazakhstan Geotechnical Society; Contact person: Dr Assel Sarsembayeva; Address: 2, Satpayev Street, Eurasian National University, Geotechnical Institute; Phone: +7-7172- 344796; Fax: +7-7172-353740; Email: paper@17arc.org: Website: https://17arc.org/; Email: info@17arc.org

THE 5TH INTERNATIONAL CONFERENCE ON GEOTECHNICS FOR SUSTAINABLE INFRASTRUCTURE DEVELOPMENT - 14-12-2023 - 15-12-2023 National Convention

Center (NCC), Hanoi, Vietnam; Language: English; Organiser: FECON Corporation, Vietnamese Society for Soil Mechanics and Geotechnical Engineering (VSSMGE), Japan Geotechnical Society (JGS), Thuyloi University (TLU), and Vietnam Petroleum Institute (VP; Contact person: Tien-Dung NGUYEN ; Address: FECON, 15th Floor, CEO Tower, HH2-1 Lot, Me Tri Ha Urban Area, Pham Hung Street, Me Tri Ward, Nam Tu Liem District, Hanoi; Phone: + 84 903 440 978p; Fax: + 84 246 269 0484 ; Email: secretariat@geotechn.vn; Website : https://geotechn.vn/

8TH INTERNATIONAL CONFERENCE ON EARTHQUAKE GEOTECHNICAL ENGINEERING - 07-05-2024 - 10-05-2024 Osaka International Convention Center, Japan; Language: English; Organiser: Japanese Geotechnical Society; Contact person: Ryosuke UZUOKA; Email: uzuoka.ryosuke.6z@kyoto-u.ac.jp

XVII PANAMERICAN CONFERENCE ON SOIL MECHANICS AND GEOTECHNICAL ENGINEERING - 12-11-2024 - 17-11-2024 Pucón, Chile; Languages: Spanish English; Organiser: Chilean Geotechnical Society (SOCHIGE); Website: https://panamgeochile2024.cl/; Contact person: Omar Núñez Esper; Address: San Martín 352, Santiago; Email: info@panamgeochile2024.cl; Website: https://panamgeochile2024.cl

NON-ISSMGE EVENTS

GEOSYNTHETICS 2023 - 05-02-2023 - 08-02-2023 Kansas City Convention Center, Kansas City, USA; Language: English; Organiser: Advanced Textiles Association; Contact person: Barbara Connett; Address: 1801 Cty Rd B W Ste 100; Phone: 6512256914; Email: barbara.connett@textiles.org; Website: https://geosyntheticsconference.com/

UNDERGROUND CONSTRUCTION PRAGUE 2023 - 29-05-2023 - 31-05-2023 Clarion Congress Hotel Prague, Prague 9, Czech Republic; Language: English; Organiser: The Czech Tunnelling Association ITA-AITES; Contact person: Czech Tunnelling Association ITA-AITES; Address: Koeluská 2450/4; Phone: +420 702 062 610; Email: pruskova@ita-aites.cz; Website: https://www.ucprague.com/; Email: masin@natur.cuni.cz

1st TC222 Workshop

We have the pleasure of inviting you to the first workshop of TC222 Geotechnical BIM and Digital Twins. The workshop will be digital on Teams and will be arranged on the 14th September 2022 from 9AM to 12AM CEST.

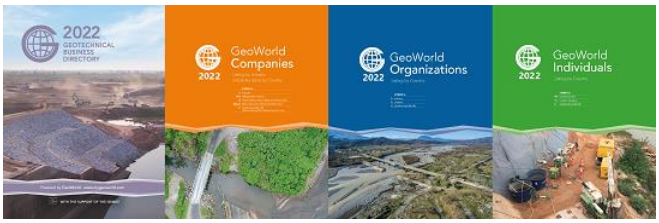
The workshop consists of five presentations, before the participants are divided into smaller groups to discuss and share experiences. The five presentations will be:

- *A modern workflow for BIM* by Mats Kahlström
- *Geotechnical data standardization with IFC and OGC* by Mickael Beaufils
- *Ongoing research within BIM and DT* by Jelena Ninic
- *BIM and Digital Twins in Geotechnical Engineering* by Raymond Koo
- *Innovative Applications on a Mega Project in Hong Kong* by Simon Leung

To participate on the workshop, please sign up here: https://forms.office.com/r/t9SdyEkk2N

Magnus Romoen / TC222 / 02-09-2022

Announcing the Publication of the 2022 Geotechnical Business Directory



Geoworld, the network for geotechnical engineers, has just published the 2022 Geotechnical Business Directory. The directory is published with the support of the International Society for Soil Mechanics and Geotechnical Engineering. This is **the eighth year for the Geotechnical Business Directory, the most comprehensive directory in the geotechnical engineering field!**

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

(a) an Online Interactive Platform,

(b) an e-book, and

(c) in-print through Amazon

The 2022 index has grown significantly since last year and includes **26,000+ members**, and **1,000**+ **geo-companies** and **geo-organizations** from a total of **162 countries**. It is expected to reach 50,000+ professionals through various media channels. The online platform of the directory allows visitors to search for professionals or companies based on location, experience, expertise, industry and other parameters. **There is no other such directory in geotechnical engineering**. The directory is also a "live" publication in the sense that as more members join and complete their profiles, the publication will become more comprehensive.

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

GeoWorld's team is already working on the 2023 Business Directory that is expected to include 30,000+ individuals and 1,100+ companies and organizations.

Income generated from the Geotechnical Business Directory is also directed as a donation to the ISSMGE Foundation.

If you are not a member of GeoWorld, visit the website and join at no cost, so that you can be part of the 2023 Geotechnical Business Directory.

ISSMGE IT Administrator / General / 07-09-2022

Attend the 9th International Congress on Environmental Geotechnics with the support of the ISSMGE Foundation!

The ISSMGE Foundation was created to aid individuals throughout the world to enhance their geotechnical engineering knowledge and practice by providing financial support for participation in technical and professional activities approved by the ISSMGE Foundation.

Individuals who are planning to attend the 9th International Congress on Environmental Geotechnics can apply by September 30th to be awarded funding by the ISSMGE Foundation for their participation to ICEG.

Read more about the 9th International Congress on Environmental Geotechnics

Click **here** for further information on the ISSMGE Foundation.

ISSMGE IT Administrator / TC215 / 13-09-2022

Vol. 6, Issue 3 of the ISSMGE IJGCH has been released!

We are pleased to announce the Issue #3 of Volume #6 of the International Journal of Geoengineering Case Histories, an official Journal of the International Society for Soil Mechanics and Geotechnical Engineering (ISSMGE).

Papers published in this refereed journal are freely available in color and are accompanied by databases that include the electronic data presented in the paper as well as additional figures (as necessary). The locations of the case histories are also positioned in the IJGCH Geographic Database.

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

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

Paper Title: 40 Years of Full-scale Infrastructure Testing at a National Geotechnical Experimentation Site: Clay Site, pp. 1-24 **Authors**: Jean-Louis Briaud Click to download

Paper Title: 40 Years of Full-Scale Infrastructure Testing at a National Geotechnical Experimentation Site: Sand Site, pp. 25-53 **Authors**: Jean-Louis Briaud Click to download

Paper Title: Asynchronous Mobilization of Shear Resistance in Slope Failures, pp. 54-72 **Authors**: Elena Zabolotnii, Norbert Ruebin Morgenstern, Gordon Ward Wilson Click to download

Paper Title: Liquefaction Ejecta Case Histories for 2010-11 Canterbury Earthquakes, pp. 73-93 **Authors**: Zorana Mijic, Jonathan D. Bray, Sjoerd van Ballegooy Click to download

About the journal and this announcement

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

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

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

ISSMGE IT Administrator / General / 12-09-2022

Waldemar Coelho Hachich (1950-2022)

TC306 will miss dearly Waldemar Coelho Hachich, Professor of Geotechnical and Structural Engineering (PEF) at Polytechnic School, University of São Paulo, Brazil, past TC306 chair (2013-2017) and always active member. For TC306, the legacy of Waldemar Hachich includes establishing the John Burland Honor Lecture and creating an alternative model for TC306's international conferences, organized in conjunction with large national conferences. TC306's int. conf. "Shaping the Future of Geotechnical Education" (SFGE 2016) was chaired and organized by Waldemar Hachich, together with other geotechnical events organized by the Brazilian Society for Soil Mechanics and Geotechnical Engineering (ABMS) in Belo Horizonte, Brazil, opening thus the SFGE 2016 sessions to a wide and diverse audience from South America.

TC306 was not the only beneficiary of Waldemar's talents. He was president of the Brazilian Society for Soil Mechanics and Geotechnical Engineering (2001-2004), and editor of the Soils and Rocks Journal (2013-2016). Waldemar's main contributions were in Modeling and Reliability of Foundations and Earth Support Structures, Risk and Reliability in Geotechnical Engineering, Geotechnical Engineering Education. Some of the honors received include being an honorary member of the Brazilian Society for Soil Mechanics and Geotechnical Engineering, and recipient of the Milton Vargas Award in Brazil.

Waldemar obtained his BSc (1972) and MSc (1978) in Civil Engineering from the Polytechnic School, University of São Paulo, Brazil, and his PhD (1981) in Geotechnical Engineering from the Massachusetts Institute of Technology, USA. Like in TC306, everywhere he went he made friends, who now cherish their fond memories of him.

Farewell, dear friend Waldemar.

Marina Pantazidou / TC306 / 16-09-2022

Webinar on Deep Cement Mixing, hosted by Geotechnical Society of Singapore (GeoSS)

The Geotechnical Society of Singapore (GeoSS) is hosting a webinar titled "Deep Cement Mixing Parameters Selection - Framework Proposal using Information from Construction Sites and Numerical Analysis.

Abstract of the seminar

Underground construction is commonly carried out in urban environments due mainly to the lack of space in such areas. In sites where soft clays are encountered, underground construction such as excavation and tunnelling can result in large soil movements which may cause damage to existing adjacent structures such as building and utilities. One method to reduce soil movement is to improve the condition of the in--situ soil by adding water and cement to form cement-treated soil blocks. Although such treatment is effective in reducing the impact to nearby structures, it often leads to a significant increase in the construction costs.

This seminar focuses on the presentation of a novel design framework which provides guidance for the systematic selection of the strength and stiffness parameters of cement-treated soil. The proposed framework incorporates the statistical and spatial variability of the treated ground. This is achieved by processing and interpreting a large database of UCS obtained from cement-treated soil field core specimens recovered from four sites in Singapore. The mean, coefficient of variation and the scales of fluctuation obtained using this data are then combined and used on a design framework where engineers can select characteristic strength and mod-

ulus parameters on a systematic and rational basis.

Biography of Gerardo Agustin Pittaro

Gerardo is an ICE Chartered Civil Engineer who has been involved in design, management, and construction support of underground construction for over 12 years. He recently obtained his PhD from the National University of Singapore. His field of research focused on the proposal of a new design framework which allows for the systematic selection of cement-treated soil parameters by combining UCS statistical and spatial variability results with FEM analysis performed on existing monitored deep excavation. He is currently working as a Technical Director in Mott MacDonald in Singapore and he is involved in several Technical ISSMGE Committees including TC214, TC211 and TC204.

The link to signing up for this free webinar can be found here: https://preview.mailerlite.com/k6e2h8w8n0/2041497889124910437/u5y5/

Siau Chen Chian / TC217 / 19-09-2022

Recordning from workshop 2022-01 is now published

The recordning from the workshop held on 14. september 2022 is now published on the brand new YouTube-channel of TC222.

The recordning can be found here: https://youtu.be/ni5exlqwOBA

Magnus Romoen / TC222 / 19-09-2022

ISSMGE - August 22 Bulletin

You can find the new ISSMGE bulletin here: https://docs.google.com/viewerng/viewer?url=www.issmge.org/filemanager/article/1057/ISSMGE_BULLETIN_2022_AUG_FINAL.pdf.pdf

In particular, note the news that on 14 March 2022, the Japan Academy decided to award the Japan Academy Prize to Professor Akira Murakami, **TC103 chair** and former president of the Japanese Geotechnical Society (JGS). The Japan Academy Prize is considered the most prestigious academic award in Japan.

Francesca Ceccato / TC103 / 20-09-2022

UNSAT2023 - call for abstract

Deadline for abstract submission for the 8th International Conference on Unsaturated Soils (UNSAT2023) is approaching (30th September 2022).

Submit an abstract at the conerence webpage (www.unsat2023.org).

We believe that this conference can be of interest to TC103 members; indeed, it will host special sessions on numerical modelling of unsaturated soil problems. The conference is organised by HSSMGE under the auspices of TC106 of the ISSMGE and will be held between 2 and 5 May 2023 on Milos Island, Greece

Francesca Ceccato / TC103 / 26-09-2022

ISRM International Society for Rock Mechanics and Rock Engineering

News
https://www.isrm.net

Prof. Pierre Bérrest 1950-2022

It is with great sadness that the ISRM informs that Pierre Bérest, Professor Emeritus at École Polytechnique, France, passed away on 28 July 2022. The thoughts of the ISRM community are with his close family and friends.

Born in Brest, France in 1950, Pierre Bérest graduated from *École Polytechnique* and *Paris School of Mines* in 1973 where he later obtained his Ph.D. in Mining Engineering. He was a researcher at the Laboratory of Solid Mechanics at *École Polytechnique* since 1981, and served as Director of the laboratory from 1990 to 2001.

During his career, Pierre's scientific and technical expertise led him to various positions, including service as Head of the Underground Security Service at the French Ministry of Industry and Scientific Advisor to the Engineering Sciences Department of the French National Centre for Scientific Research (CNRS). Prof. Bérest was appointed by the French Parliament as Chairman of the French Standing Committee for Nuclear Waste Management, as Expert for the Scientific Council of IFPen (formerly, *Institut Français du Pétrole*), as Member of the International Geomechanical Commission on Underground Nuclear Testing in French Polynesia (1988-1999), as Member of the Editorial Board of the international journal *Oil & Gas Science and Technology*, and as Member of the Blue Ribbon Commission for the U.S. state of Louisiana after the collapse of Bayou Corne (2013-2014).

Prof. Bérest authored two books and over 200 scientific papers in the field of Continuum Mechanics applied to underground works (plasticity, visco-plasticity, buckling, thermo-mechanics, thermodynamics of gas storage caverns, tightness tests) such as mines, tunnels, and underground storage facilities for gas, oil, CO_2 or nuclear waste. He was awarded the *Grand Prix Gaz de France* by the French Academy of Sciences in 1999.

As distinguished rock engineer, Prof. Bérest was President of the *Comité Français de Mécanique des Roches* from 1996 to 1999 and President of the Solution Mining Research Institute in 2011. He co-chaired the organizing committee of the 9th ISRM-International Congress on Rock Mechanics held in Paris, in 1999, and of the 3rd and 7th Conferences on the Mechanical Behaviour of Salt (Saltmech), also held in Paris. He

co-supervised the publication of two reference books on rock thermo-mechanics: *La thermomécanique des roches* (1988, BRGM Ed.) and *Manuel de Mécanique des Roches –Tome V - thermomécanique des roches* (2017, Presses des Mines). He has always defended the originality of French rock mechanics based on the promotion of physical and mathematical approaches aimed at going beyond simple empiricism.

2022-09-04

39th ISRM Online Lecture by Prof. Yingxin Zhou is online

For the 39th ISRM Online Lecture, the ISRM invited Prof. Bruce Hebblewhite, Emeritus Professor at the University of New South Wales (UNSW) in Sydney. The title of the lecture is "Non-conventional surface subsidence – a challenge for an improved fundamental understanding". It will broadcast on the 22nd September 2022, 10 A.M. GMT. Follow this link to know more.

2022-09-05

9th ISRM Young Members' Seminar

The ISRM Young Members' Seminar (YMS) Series is a new ISRM Young Members Group initiative. It consists of a series of virtual events to provide a global platform for ISRM young members to share knowledge, experiences, and ideas. More details on the YMS are available on this page.

After eight very successful editions, the 9th ISRM Young Members' Seminar will take place on 20 September at 2 P.M. GMT, with speakers from Italy and USA, in an event in collaboration with AGI and SEMR:

- Deformation analysis and monitoring in underground constructions: automatic systems to measure convergence and preconvergence effects - Dr. Alessandro Valletta (University of Parma, Italy)

- Introducing CSM2020 – Discrete Event Simulation Model for Predicting TBM Utilization - Dr Anuradha Khetwal (Consultant Geotechnical Engineer, WSP USA)

You can join using the Zoom link created for each Seminar and participate in the question and answers period. The Seminars will also be live-streamed to the ISRM YM's YouTube channel, where they will be stored. **Click here to download the flyer**.

Stay tuned for details on the next edition from the YMS organising committee.

Sevda Dehkhoda
Chair of the ISRM Young Members Committee

2022-09-14

Videos of the Workshop of the Commission on Testing Methods in Eurock 2022, Helsinki

The presentations of the Workshop of the Commission on Testing Methods held during Eurock 2022 in Helsinki, September 2022 are available on this page.

2022-09-29

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

Scooped by ITA-AITES #75, 13 September 2022

Chennai: 2 more TBMs arrive from China; to be deployed for 9km twin tunnels | India

What we know about Melaka's new link that'll connect Malaysia & Indonesia

Besix, MT Højgaard land €346m Nordhavn Tunnel job | Denmark

IIT (BHU) signs MoU with DMRC to establish centre of excellence for tunnelling and underground space engineering | India

Bengaluru Metro's tunnel boring machine `Varada' set to hang its boots on Friday | India

Contractors shortlisted for Melbourne Suburban Rail Loop tunnelling contracts | Australia

China's biggest EPBM sets advance record | China

SANDAG advances plan for Del Mar train tunnel. 'This is a momentous day' | United States of America

Operator shows digging of tunnel to release treated water from Fukushima Daiichi | Japan

Tunnelling work has started on the controversial Silvertown Tunnel | UK

Scooped by ITA-AITES #76, 27 September 2022

2026 rail tunnel Graz - Klagenfurt promises to transform south Austria

Construction of Toganali-Kalbajar-Istisu road & Murovdag tunnel underway | Azerbaijan

World's longest immersed tunnel under construction | Denmark-Germany

California adjusts plans for 45-Mi. underground water tunnel | United States of America

[Auckland's huge waste water tunnel project starts dig under Manukau Harbour | New Zealand]

[Sea safety and the Stad Ship Tunnel project | Norway]

[Eight bidders vie to build Bosnia's 400 mln euro Prenj tunnel | Bosnia]

[NHRCL invites bids for 21-km long tunnel; tender includes India's first undersea tunnel for bullet train project | India]

[Jerusalem turns sewer line into tunnel for cyclists | Israel]

[What we know about Melaka's new link that'll connect Malaysia & Indonesia]

North Bristol Relief Sewer Project

Speaker: Dominic Barlow

Thursday 15th September 2022 at 18:00 hrs [UTC+1]

J Murphy & Sons commenced construction of a new 6.5km pipeline for Wessex Water in summer 2019. When completed it will connect Bristol's trunk sewer in Lawrence Weston to the Frome Valley relief sewer near Cribbs Causeway and will direct waste more efficiently around North Bristol to the water recycling centre in Avonmouth.

5.5km of 2.85m diameter segmentally lined tunnel has been completed using an EPB TBM with the remaining 1km predominantly constructed using open cut methods.

The presentation will overview of the project, initial optioneering that was carried out to develop the scheme & progress and achievements to date.

Note: This is an in-person event which can also be streamed online at: [https://youtu.be/wqQx5z_LwMk]

BTSYM September Lecture - The Belgian Tunnelling Method and its use in the Madrid Metro

Speakers : Robert Sizer, Cláudio Dias

This presentation will cover the Belgian Method, which is a method for tunnel construction with over 100 years of tradition. This method is extensively used in Madrid, particularly presented in all the expansions of Madrid Metro starting in 1917. It uses a unique excavation sequence that comprises the division of the crown in a series of pocket excavations that are successively supported by a combination of struts, waler beams and wood planks, and directly followed by typically, an unreinforced concrete lining installation. The speakers will focus on how AYESA's latest design approaches enhance our understanding of this historic tunnelling method.

Note: This in-person lecture will also be streamed live at [https://www.youtube.com/watch?v=ZIWaW8YJTcg]

GEOLAB's Second Call for Proposals is now open!

This Call for Proposals is an invitation to all eligible organisations (the eligibility criteria can be found **here**) to submit a proposal for an experiment to be hosted in one of GEOLAB's facilities. The theme of the call is: ***'Experiments to study the pressures on Critical Infrastructure, e.g., impact of climate change, aging, increased usage, extreme weather events and geo-hazards.'***

The research infrastructure installations are used to study the following:

- *Ground stability related issues, e.g. consolidation, seepage, liquefaction, (coastal) erosion and slope stability.*
- *Water-soil-structure interaction, e.g. for roads, railways, tunnels, bridges, dams, foundations, buildings and buried cables & pipelines.*
- *Interaction of infrastructure systems with the environment, e.g. impact of climate change, extreme weather events, geo-hazards, static & dynamic loading and aging.*

A guide on technical details about the capabilities of physical modelling at the experimental facilities can be found in the GEOLAB Research and Innovation document **here,** which will help prospective Users prepare their proposal. We ask prospective Users of the facilities to make it clear in their proposal how their research will contribute to the understanding and enhancement of the resilience of Critical Infrastructure in Europe.

The GEOLAB project provides User Groups access **free of charge** to the facilities for their research project and covers travel and subsistence costs (within prescribed limits) as well. State-of-the-art measuring instruments, data-acquisition and processing systems will be available, as well as modern support facilities, such as library, computers, and internet access. Furthermore, visiting researchers are offered a scientific and intellectual environment, with assistance and guidance from experts at the host institute.

The deadline for proposals is **September 30th, 2022, 23.59 CET.**

The received proposals will be reviewed by a group of independent experts and the outcome is expected to be announced on **January 15th, 2023**.

Follow us on **Twitter** and **LinkedIn** to stay up the date with the development of these proposals as well as future events

https://project-geolab.eu/geolabs-second-call-for-proposals/

ΔΙΑΚΡΙΣΕΙΣ ΕΛΛΗΝΩΝ ΓΕΩΤΕΧΝΙΚΩΝ ΜΗΧΑΝΙΚΩΝ

Lessons Learned From GeoLegends

George Gazetas, Ph.D., M.ASCE

Το περιοδικό GEOSTRATA του Geo-Institute της American Society of Civil Engineers δημοσίευσε στο Τεύχος Αυγούστου – Σεπτεμβρίου 2022, στην ενότητα Lessons Learned From GeoLegends, συνέντευξη του Δρ. Γιώργου Γκαζέτα, Ομότιμου Καθηγητού ΕΜΠ και τέως Προέδρου της ΕΕΕΕΓΜ στους Newgard και Parayancode

By Jeffrey T. Newgard, P.E., S.M.ASCE, and Athul Prabhakaran Parayancode, S.M.ASCE

George Gazetas is an emeritus professor of civil engineering at the National Technical University of Athens (NTUA) in Greece, and a renowned expert in earthquake geotechnical engineering, soil dynamics, and seismic soil–structure interaction. He received a diploma in civil engineering from NTUA (1973) and a master's and a Ph.D. degree in civil engineering from MIT (1975, 1976). His academic career spans over four decades, with faculty positions in civil engineering at NTUA, SUNY Buffalo, RPI, and Case Western. He's published several landmark papers on soil dynamics and soil–structure interaction, inspired by his consulting experience and field observations following earthquakes.

Gazetas has received several awards in recognition of his research (from ASCE, ICE, and ISSMGE) and delivered the prestigious Coulomb, Ishihara, Maugeri, and Kenneth Lee lectures. He's most proud of his Excellence in University Teaching Award in Greece, and his Rankine Lecture in London. Many of his students currently occupy key positions in academia and industry in the U.S. and Europe.

Q. Without any engineering background in your family, what initiated your interest in becoming a civil engineer?

Indeed, my family did not have a single engineer. But in the 1960s and 1970s in Greece, multistory building and infrastructure construction was booming in the aftermath of unprecedented destruction during World War II and the subsequent civil war. At that time, civil engineering was perhaps the most prestigious of all disciplines, with civil engineers being prominent in all aspects of Greek society. And like other students at the time who had an interest in mathematics and science, I chose civil engineering, attending the five-year diploma-course at NTUA, which was reputably the best school in the country.

Q. What led you to pursue your interest in geotechnical engineering? Were you attracted to this area due to the new frontiers being pursued? What was the influence of your mentors/advisers?

The first application of dynamics was for heavy machine foundations in the 1930s and 1940s. The Cold War triggered further interest in blast loading and seismology, but in the 1960s, earthquakes came to the forefront after two events in Alaska and Niigata, both in 1964. Devastation due to extensive and unprecedented geotechnical failures brought soil dynamics into prominence.

I was particularly fortunate with all my academic advisers. First with Professor Theodosios Tassios, a true giant in civil engineering. His threeyear course in reinforced concrete imbued us with the science of using simple, physically motivated solutions to the most complicated problems. You can see how this motivated my later development. Tassios had started his professional career in soils and foundations, so I'm sure this contributed to his outstanding teaching, which went well beyond the endless formalism of some engineering mechanics professors.

Gazetas (r) with Professor Theodosius Tassios (l), one of his mentors, and esteemed colleagues Professors Gregory Penelis and Vasilis Papzachos.

My second good fortune came at MIT when I was assigned as a research assistant to a young professor, Jose Roesset, a most brilliant researcher and teacher. Jose took me by the hand, as he'd been doing with all his students, to arrive at solutions to complex problems. His ethical standards and unassuming character were exceptional; he treated all his stu-

dents as royalty, asking nothing in return. I've been inspired to try to emulate him in my own professional career.

Jose Roesset

After completing my master's thesis, I was assigned to Professor Erik Vanmarcke, an expert in random fields, after Roesset undertook sabbatical leave in Spain. Years later, I applied my probabilistic training from Vanmarcke to earth dams and slopes, but my heart was in foundation dynamics rather than probabilistic analyses.

Erik Vanmarcke

Q. With a roster of pioneers in soil dynamics and graduate students who would shortly become leaders in geotechnical engineering, how did that atmosphere inspire you during your Ph.D. studies at MIT? Who were your favorite professors?

The geotechnical faculty at MIT were influential and left imprints on my development. Bob Whitman was teaching novel soil dynamics and earthquake engineering material. I vividly recall him explaining the sliding block concept that he actually invented in about 1960; he later introduced it to Nathan Newmark, who extended and popularized it in his 1965 Rankine Lecture.

Nathan Newmark

Chuck Ladd was a true master in explaining soil behavior with amazing clarity. The benefit I got from his teaching was so great that despite my being mostly involved in theory, I could work in geotechnical practice just as easily.

Chuck Ladd

Bill Lambe was the leader of the group; he had just given his Rankine Lecture, "Predictions in Soil Engineering," when I joined. His course on earth structures involved an in-depth analysis of four case histories from practice. He and his excellent research associate Allen Marr guided us through some intriguing aspects of real-life projects, one of which involved a huge caisson in the Netherlands for flood protection. I used my background in foundation vibrations to present a solution. Marr and Professor Lambe were initially surprised, and, after additional discussions, congratulated me. I'll never forget this, and hope Allen remembers it as well.

Bill Lambe

Allen Marr

On my first day at MIT, I met Mishac Yegian, another graduate student who would become one of my dearest friends. An enthusiastic person, Mishac had just completed his master's at UT Austin and started working with Professor Whitman. He was selfless and would explain, teach, and help, despite us being "competitors." He's been a professor at Northeastern University, is still an amazing geotechnical consultant, and our friendship still lasts.

Mishac Yegian

The prevailing culture at the MIT Geotech division was fascinating, but also surprising. Despite the university's rich tradition in theory, application of research to engineering practice was considered most important for doctoral studies. The observational method was held as the key tool in geotechnical engineering. It's not a coincidence that most of our doctoral classmates chose industry rather than academia. I chose the latter, but I have the highest respect for geotechnical practitioners.

Gazetas with former students following his delivery of the 59th Rankine Lecture, "Benefits of Unconventional Seismic Foundation Design," in 2019.

Q. You've published landmark papers with Professor Ricardo Dobry at RPI. What do you most remember about this time, and what made those years so productive?

I got to know Dobry when I joined the faculty at RPI in 1981. The chemistry that developed between the two of us was indescribable. Ricardo was a de facto adviser to me, even though we were colleagues. During every discussion, even at lunch, ideas flowed. My whole perspective on research changed during those years together. For example, we developed new ways of treating the dynamic response of foundations. I'm most happy with one of our papers on pile groups, where a very simple, physically motivated, closed-form solution elegantly captured pile-to-pile interaction. These days, with advanced, user-friendly software, it's easy to start modeling numerically rather than developing simplified solutions, but I've always tried to start solving a problem from its bare essentials, using "first principles." Ricardo's influence complimented the teachings of my academic advisers.

Q. What advice do you have for entry-level engineers and early career researchers in developing and pursuing their interests?

First, read ! Reading articles from civil engineering and other disciplines helped me personally. One of my ideas for treating earth dams as inhomogeneous came from an article on aerodynamics. I have no idea how I found it, but that article helped me follow the author's process. A reasonable solution emerged for seismic analysis of earth dams, which I later extended to footings and piles. All this came from endless reading.

Second, observe ! Take the initiative to observe structures following natural disasters to broaden your understanding. Travel to an earthquake-stricken region to see firsthand not just engineering phenomena, but also the distress on the affected people. This will change, mature, and transform you into a better engineer and person.

Last, and most important, love your work ! Even if you're lukewarm at first, the moment you go deeper and get more insight, even the most mundane tasks eventually become attractive. I believe this is key to success.

Q. Your impressive list of very successful students — now professors or professionals — includes many women. How important is diversity in growing the geoprofession?

Forty percent of my master's and 30 percent of my doctoral students have been women, but that's not surprising because the civil engineering classes at NTUA have been about 40 percent female. Needless to say, some of my most brilliant doctoral students were female, and four of them are in the U.S., two in academia and two in industry. In our school, at least 50 percent of the top-ranked students are female. I believe it is stupid to undervalue 50 percent of humanity.

Q. You've participated in numerous earthquake reconnaissance surveys following major events. Please share some of your experiences from these surveys, and how significant were they for your research?

Field reconnaissance and observations after earthquakes has become my passion. Surveys from several earthquakes resulted in great material for class lectures and applications in practice, apart from publications.

In 1994, after the Northridge earthquake, I had the opportunity to survey areas of Los Angeles with Mishac Yegian, Nikos Makris, and Panos Dakoulas, all professors in the U.S. This expedition fueled my interest in the seismic design of bridges.

One year later in Japan, the Kobe earthquake took place, which literally shook the profession. All types of structures suffered, from bridges and buildings, to harbors, subways, and retaining walls. I'm still investigating geotechnical aspects of this earthquake, and have applied several observed successful designs in my own practice. I'm not the same engineer that I was before the Kobe earthquake.

Four and a half years later, the Kocaeli Earthquake in Turkey triggered new interests. Of note from this event was how some buildings in Adapazari settled and overturned due to bearing capacity failures, while in Gölcük some structures survived on top of normal faulting with offsets ("throws") of several meters. Both phenomena were unprecedented and at a scale not seen before. A large part of my subsequent research and practice were inspired from these observations.

Travel to an earthquake-stricken region to see firsthand not just engineering phenomena, but also the distress on the affected people. This will change, mature, and transform you into a better engineer and person.

More recently, I visited Christchurch in New Zealand, in the aftermath of the 2010-2011 earthquakes; Sendai in Japan, after the 2011 Tohoku "tsunamigenic" earthquake; and several earthquakes in Greece. To this day, I advise my students not to miss the opportunity to visit places in the aftermath of earthquakes.

Q. Your consulting career includes several important projects, such as the Brunsbüttel Nuclear Power Plant (Germany), the Ohba-Ohashi Bridge (Japan), and the Tagus River Bridge (Portugal). What did you learn from

these projects, and do you feel that consulting is important to academics?

As an academic, I first learned the importance of getting involved with practice from my professors at MIT, where consulting took on an aura of prestige. From the very beginning, I sought out consulting work. The seismic analysis of the Brunsbüttel Nuclear Power Plant and Ohba-Ohashi Bridge began as consulting projects that turned into research endeavors lasting about three years each. They dealt with pile groups in very soft clays.

In the Tigcilar District of Adapazari, Turkey, Gazetas stands atop an inclined sidewalk beside a building that had settled 60 cm due to bearing capacity mobilization. The situation may have been exacerbated by liquefaction following the İzmit Earthquake in 1999.

The Ohba-Ohashi Bridge was a unique learning opportunity because the bridge, its foundations, and the soil were fully instrumented; we received from Dr. Takashi Tazoh (chief research manager of the Institute of Technology of Shimizu Corporation) numerous seismic response histories not only of the ground and structure, but, most significantly, from two of the 64 piles, along their full length. The piles experienced large bending moments at their top, and at 20-m depth due to the substantial stiffness contrast between the very soft soil and the underlying bearing layer. Thus, the phenomenon of "kinematic" pile distress was made clear, and we persuasively argued and succeeded in inserting "kinematic" soil–pile interaction into Eurocode 8.

The Tagus River Bridge was a groundbreaking structure forits time in the early 1960s. It borrowed a construction technique used for the Old Bay Bridge in San Francisco, where large caissons were built top-down until they sank into the soft seafloor. Construction of the Tagus 88-m-tall caisson (55 m of which were embedded in soil and 27 m extending through water) was a miracle. Our analyses revealed that the caissons would likely uplift during strong seismic shaking — an effect the original designers perhaps did not intend, but, as we know from work on rocking foundations, one that may not be disadvantageous.

The fascinating thing about earthquake engineering is that there's no general all-purpose cookbook for design!

These are the stories of large, glorious projects. However, we should not forget or shy away from the lessons learned from small projects. The humble footing, for example, may as well pose problems that require ingenuity, and may give engineers good experiences.

Q. Your Rankine Lecture, "Benefits of Unconventional Seismic Foundation Design," implies a change to established engineering practice, pushing the envelope of foundation design by allowing for plastic deformations during earthquakes. Did you ever find resistance or skepticism to new, unconventional ideas?

The idea of a foundation deliberately designed to uplift and especially provoke bearing capacity failure mechanisms has been an anathema to engineers for many years. However, the vast number of theoretical studies that have been performed by several researchers (including the excellent experiments mainly in the centrifuge of UC Davis by Professor Bruce Kutter and co-workers) have gone some way to convince the engineering community of the efficacy of this design approach.

In Europe, the forthcoming version of the Eurocode has taken a small step in allowing this unconventional behavior. For example, some large monumental structures like the Rio-Antirrio Bridge are supported by 90-m-diameter surface foundations designed to uplift and slide if needed.

Regrettably, not all designers are yet convinced. Improving structural performance by mobilizing bearing capacity and taking advantage of the natural re-centering of an uplifting foundation depends on the nature and use of the structure. The fascinating thing about earthquake engineering is that there's no general all-purpose cookbook for design!

Designed by French engineer Alain Pecker, the Rio-Antirrio Bridge, one of the world's longest multispan, cable-stayed bridges, is supported on soil deposits with four, 90-m-diameter surface foundations. It crosses the Gulf of Corinth, linking Rio on the Peloponnese peninsula to Antirrion on mainland Greece.

Q. We understand you've been organizing an annual field trip to Kobe, Japan, with your senior soil dynamics class students that's become a lifetime highlight for all of them. What's the origin of this initiative and your friendships in Japan?

When my collaboration with Takashi Tazoh for the Ohba-Ohashi Bridge was about to finish, the Kobe earthquake changed everything. Our work took a new direction, and I joined Tazoh in Kobe just 3-4 weeks after the event. Then in 1998, Ioannis Anastasopoulos and Maria Nikolinakou, two students in my soil dynamics class, prompted me to organize a field trip to explore the effects of the earthquake and observe reconstruction efforts. Thanks to Tazoh's help, the trip was a tremendous success. We've now annually visited Kobe without interruption for 20 years since the first trip, and today we extend invitations to professors and students worldwide.

Before each trip, my students must pass an exam to demonstrate an understanding of the technical details of the Kobe earthquake and their English communication skills. We're seeing actual damage and retrofitted structures. Fascinating museums have been erected for commemorating each major new project and for preserving the seismic failures them-

selves, such as of the harbor quaywalls, the Nikawa landslide, and the bridges of the Hanshin expressway. This trip provides an excellent educational experience to students.

Gazetas with Takashi Tazoh and senior students under the Akashi Kaykio Bridge during an annual soil dynamics class visit to Japan in 2017.

Q. You've inspired a generation of young civil engineers during your more than 30 years at NTUA. What gratification do you take from their success, and how does this relate to the Excellence in Teaching award you received in Greece?

Teaching at NTUA has been very rewarding, stemming primarily from the fact that our School of Civil Engineering attracts some of the best students in Greece. In particular, I love teaching soil mechanics, especially the Rankine and Coulomb lateral earth pressure theories. Over the past 10 years, I've developed a new static soil-foundation-structure interaction course for undergraduate students, emphasizing the development of simple approaches to develop engineering solutions.

Even for courses I've taught for many years, I take time to prepare lectures and each time write new exam questions. I've found that grading homework assignments by myself provides insights into the often-imaginative ways students solve problems, what they understand, and what they're struggling with. Over the years, I've learned to avoid unnecessary details in the material I cover in class. If you try to give too much information, you gain little — it's mostly a waste of time. Students forget details (e.g., the formula for wall pressure with sloping backfill) very quickly. But if you show them a simple, two-line elastic solution using Hook's law, they'll remember that stresses decrease as the wall moves outward! I perform little class experiments, some even "childish" experiments, to illustrate basic concepts. Take for example, a package of vacuum-packed coffee. When sealed, it's extremely rigid — you cannot bend it, let alone compress it. Puncture a hole and it loses its strength and deforms very easily — a perfect illustration of the effective stress principle in soils.

I'm happy to have received the 'Excellence in University Teaching' award that is given to one professor each year, from all Universities in Greece. The selection is made based on genuine letters of recommendation only from former and current students; this gives the award a special meaning.

Q. You've published several papers considered classics in geotechnical practice. Which is your proudest technical contribution? Is there an area of your work that you believe is under-appreciated or has untapped potential?

Several papers that I wrote with Professor Ricardo Dobry (RPI) come to mind on the dynamics of pile groups, the stiffnesses of shallow and embedded foundations, and the comparisons with Ken Stokoe's (UT Austin) experiments. The latter were physical experiments involving dynamic loading of embedded foundations. We used these tests to verify our analytical solutions. The findings were surprising, as some predictions were extremely good, while some were very poor. The explanation as to why some predictions were poor was the most important finding — the essence, I believe, of foundation dynamics. But the type of insight we gained doesn't seem to attract as many people as when you provide simple formulas!

I'm also fond of some of my early papers on inhomogeneity and its effect on the seismic response of earth dams and foundations. In recent years, I've focused on foundation rocking and its benefits for the structural response, with the help of many brilliant students such as Ioannis Anastasopoulos, now a professor at ETH Zurich, and many others.

Gazetas teaches earth pressure theory to an undergraduate class.

Q. We understand you are a big football (sic. soccer) fan. What are your other hobbies and outside interests? What do you like most about life in Greece?

Well, I still love football. When I was 11, we often played for five hours a day, but later I receded. I rediscovered football during my graduate studies, when our team won the annual MIT student cup twice.

As for hobbies, I love to walk in cities as well as in mountains and forests. But my main hobby is reading. History, anthropology, evolution, and these days astrophysics are my favorite subjects, from authors such as Ian Morris, Richard Dawkins, Jared Diamond, Carl Sagan, and Neil deGrasse Tyson. Reading has been a tremendous help in my little understanding of the world. I also like all types of music… classical, pop, rock, ethnic. I love the (unsurpassed) music of the 1960s and 1970s of Greece, Italy, and France — unfortunately not heard very often these days.

Life in Greece? It can be very interesting. It can also be hectic at times. I mostly like its nature and the archaeological heritage. To avoid Athens during the pandemic, we stayed for several months at a time in our cottage in a beautiful village at elevation 1000 m, surrounded by 2500-m-tall mountains. Walking and mild climbing there feels like being in paradise. No need to deal with city hassle!

https://www.readgeo.com/geostrata/august_september_2022/MobilePagedArticle.action?articleId=1809520#articleId1809520

ΠΡΟΣΕΧΕΙΣ ΓΕΩΤΕΧΝΙΚΕΣ ΕΚΔΗΛΩΣΕΙΣ

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

10th Nordic Grouting Symposium, 4 - 6 October, 2022, Stockholm, Sweden, https://www.ngs2022.se/

V Central Asian Conference on Soil Mechanics and Geotechnical Engineering, 05 – 07 October 2022 Samarkand, Uzbekistan, http://conference.geotechnics.uz

Smart Geotechnics 2022, 6 October 2022, London UK, https://smartgeotechnics.geplus.co.uk/smartgeotechnics/en/page/home

II Conference on Slope Repair and Remediation - II Conference of Mountain Roads, 6 – 7 October 2022, San José, Costa Rica (+ virtual), www.geotecniacr.com/seminario/index.html

IX Latin American Rock Mechanics Symposium - Challenges in rock mechanics: towards a sustainable development of infrastructure, an ISRM International Symposium, 16-19 October 2022, Asuncion, Paraguay, http://larms2022.com

5ο Πανελλήνιο Συνέδριο Αντισεισμικής Μηχανικής και Τεχνικής Σεισμολογίας, 20-22 Οκτωβρίου 2022, Αθήνα, https://5psamts.eltam.org

GEO-EXPO 2022 Scientific and Expert Conference, 21st October 2022, Prijedor, Bosnia and Herzegovina https://www.geotehnika.ba/naslovnica/Third%20GEO-EXPO%202022%20-%20new.pdf

2022 GEOASIA7 - 7th Asian Regional Conference on International Geosynthetics Society, October 31 – November 4, 2022, Taipei, Taiwan, www.geoasia7.org

ATC 2023
Australasian Tunnelling Conference

18th Australasian Tunnelling Conference 2023
Trends and Transitions in Tunnelling
November 5 - November 8, Auckland, New Zealand
https://atc2023.com

With a theme of Trends and Transitions in Tunnelling – the 18th Australasian Tunnelling Conference in New Zealand is already shaping up to be the most anticipated event on the 2023 calendar.

The ATC will be hosted by the NZTS in Auckland, Aotearoa New Zealand between the 5th and 8th November 2023.

With an overarching focus on *Trends and Transitions in Tunnelling*, the main themes of the conference (in English and Māori – a huge part of New Zealand's national identity), include:

- **Resilience:** Manawaroa; wellbeing, infrastructure, economics.
- **Relationships:** Hononga; industry, stakeholders and future generations.
- **Guardianship:** Tiaki; sustainability and legacy. Re-purposing and enhancing existing infrastructure, decarbonisation.
- **Future (s):** Anamata; what kind of infrastructure is needed.

The conference committee are specifically looking for abstracts on the following topics, but all abstracts relevant to tunnelling are welcomed:

- Transition engineering, sustainability and economic growth
- Metros and mass transit
- Digital engineering, instrumentation and monitoring
- Hydropower and utility tunnels
- Mechanised tunnelling
- Conventional tunnelling/SEM/caverns
- Tunnel operations, asset anagement, repurposing and rehabilitation
- Tunnel systems, ventilation and fire life safety
- Human factors: users, resourcing, training, competency education and diversity
- Safety and occupational safety
- Underground architecture and space development
- Grouting, ground modifications and hydrogeology
- Sprayed concrete and tunnel linings
- Automation and technological advances
- Shafts
- Tunnels and tunnelling for mines
- Geotechnical characterisation, seismicity and difficult ground
- Risk management, collaboration and contracting

cGts - 50th jubilee Annual conference GEOTECHNICAL ENGINEERING AROUND US AFTER 50 YEARS, 14th and 15th November 2022, Brno, Czech Republic, www.cgts.cz/en

CouFrac 2022 - 3rd International Conference on Coupled Processes in Fractured Geological Media: Observation, Modeling, and Application, November 14-16, 2022, Berkeley, California, USA, https://coufrac2022.org

Piling & Ground Improvement Conference 2022, November 16-18, 2022, Sydney, Australia, https://events.american-tradeshow.com/pilingconference2022

AUSROCK Conference 2022, 6th Australasian Ground Control in Mining Conference –an ISRM Regional Symposium, 29 November – 1 December 2022, Melbourne, Australia, www.ausimm.com/conferences-and-events/ausrock/

16th ICGE 2022 – 16th International Conference on eotechnical Engineering, Lahore, Pakistan, 8-9 December, 2022, https://16icge.uet.edu.pk/

https://www.dfi.org/grout2022

#GROUT22 is organized by Deep Foundations Institute (DFI) and International Conference Organization for Grouting (ICOG) with support from Geo-Institute's Grouting Committee present the 6th International Conference on Grouting and Deep Mixing. Be updated on the latest grouting practices, network with industry professionals, view the latest technology and services in the Exhibit Hall ... all while enjoying the excitement and diversity of the Big Easy! This legacy event celebrates 40 years of grouting technology and practices, covering all types of grouting for foundation projects. Keynote lectures, technical paper presentations, and panel discussions will present and debate advances in methods, materials, instrumentation, and control; highlighting their use and understanding for a variety of applications.

Topics cover anchors and piles; cement-based grouts; chemical and other grouts; dam foundation grouting, grout curtains, and cutoffs; deep mixing methods, applications, and performance testing; grouting for seepage control; highways and transportation; jet grouting; karst grouting; levees and flood walls; low mobility grouting; mine applications; permeation grouting; performance testing; structural support; and tunneling.

ATA GEOSYNTHETICS CONFERENCE, Feb. 5-8, 2023, Kansas City, MO USA, https://geosyntheticsconference.com

4th African Regional Conference on Geosynthetics – Geosynthetics in Sustainable Infrastructures and Mega Projects, 20-23 February 2023, Cairo, Egypt, www.geoafrica2023.org

ASIA 2023, 14 - 16 March 2023, Kuala Lumpur, Malaysia, www.hydropower-dams.com/asia-2023

3rd International Conference TMM_CH "Transdisciplinary Multispectral Modelling and Cooperation for the Preservation of Cultural Heritage: Recapturing the World in Conflict through Culture, promoting mutual understanding and Peace", 20-23 March 2023, Athens, Greece, www.tmm-ch.com

www.dfi.org/2023-conference-on-foundation-decarbonization-reuse

The Construction Industry is largely contributing to the CO2 emissions, and so is the Deep Foundation Industry. With sustainability becoming every day more relevant, foundation design has to be viewed differently. Decarbonization is the first option: more efficient design reducing volumes of concrete or steel, the use of different materials with lower carbon footprint. This should not be viewed as the only option available: the reuse of existing foundations must be considered as well, and even preferred as the most sustainable option.

In March 2023, DFI Europe and the Geotechnical Section of the KIVI will host a 3-day conference, including an optional one-day site-visit, to discuss these burning topics in Amsterdam, The Netherlands.

In this city, foundations using timber piles (one of the more sustainable construction material) have been used for long, and given the age of many structures the issue of the foundation reuse is a recurring topic of endless debate. This can be because the loads have increased since the structure was first designed, as is the case with the bridges in Amsterdam, or because a new building is constructed to replace a structure that no longer meets the current requirements.

But of course, there are many other places in the world where this issue is getting momentum, with urban centers being reconstructed and transformed, and the issue is also is not limited to just timber piles. How do you address the remaining service life of steel piles that may have been subjected to corrosion? Or how do you assess the bearing capacity of any foundation pile, for which the original design and construction data is no longer available?

In this International Conference all these aspects will be covered in 4 sessions that will focus on the overall concept of foundation decarbonization and reuse, the assessment of existing foundations, the design aspects associated with this topic, and finally the impact this approach will have on the construction phase.

Papers from all around the world will be presented following a keynote address to introduce each session. And we hope that you will join us in Amsterdam to listen to these presentations and to participate during panel discussions with the presenters.

88th ICOLD Annual Meeting & Symposium on Sustainable Development of Dams and River Basins, April 2023, New Delhi, India, https://www.icold2020.org

Rocscience International Conference 2023 Synergy in Geotechnical Engineering, April 24-26, 2023, Toronto, Canada, www.rocscience.com/events/rocscience-international-conference-2023

UNSAT 2023 - 8th International Conference on Unsaturated Soils, 2-5 May 2023, Milos island, Greece, www.unsat2023.org

World Tunnel Congress 2023 Expanding Underground Knowledge & Passion to Make a Positive Impact on the World, 12 - 18 May 2023, Athens, Greece, https://wtc2023.gr

NROCK2022 - The IV Nordic Symposium on Rock Mechanics and Rock Engineering, 24 – 25 May 2023, Reykjavic, Iceland, www.nrock2023.com

Underground Construction Prague 2023, May 29 – 31, 2023, Prague, Czech Republic, www.ucprague.com

17DECGE Danube – European Conference on Geotechnical Engineering, 7-9 June 2023, Bucharest, Romania, https://17decge.ro

www.dfi.org/superpile2023

The technical committees of DFI and ADSC combined their industry expertise to organize SuperPile '23. This three-day conference includes presentations on the latest developments in:

- Driven piles
- Augered cast-in-place/drilled displacement piles
- Micropiles
- Marine foundations
- Testing and evaluation of foundation systems
- Seismic and lateral loads
- Drilled shafts
- Ground improvement (related to piling)
- Helical piles and tiebacks

Presentations will showcase "super" innovations, challenges of designing and constructing CFA piles, and current trends in deep foundations. Program highlights include a keynote presentation on Georgia geology and deep foundation history, DFI's Osterberg Memorial Lecture, and a panel discussion titled "Is the Industry Moving to Electric Powered Construction Equipment?".

On Wednesday, June 7, DFI committees will meet in the afternoon to discuss progress on various committee projects and in the evening from 6:00-8:00 p.m. the men and women of the Women in Deep Foundations Committee will host a not-to-be-missed networking reception at Skyline North on the 10th floor of the Atlanta Marriott Marquis.

On Thursday, June 8, plenary sessions will present a variety of technical topics featuring one panel discussion, keynote and invited speakers as well as the annual Osterberg Memorial Lecture.

Two parallel session tracks on Friday, June 9, will provide attendees the option to choose presentations of interest. Invited and selected presentations will highlight advancements, innovations and challenges in design and construction of deep foundations, particularly related to piling solutions.

3rd JTC1 Workshop on "Impact of global changes on landslide risk",7 – 10 June 2023, Oslo, Norway, https://jtc1-2023.com

9th International Congress on Environmental Geotechnics Highlighting the role of Environmental Geotechnics in Addressing Global Grand Challenges, 25-28 June 2023, Chania, Crete island, Greece, www.iceg2022.org

DFHM8 TORINO 2023 8th International Conference on Debris Flow Hazard Mitigation, 26-29 June 2023, Torino, Italy, http://dfhm8.polito.it

NUMGE 2023 - Numerical Methods in Geotechnical Engineering 2023, 26 - 28 June 2023 Imperial College London, UK, www.imperial.ac.uk/numerical-methods-in-geotechnical-engineering

www.dfi.org/s32023

Deep Foundations Institute (DFI) S3: Slopes, Support and Stabilization is a 2.5-day conference on the practical application of deep foundations and ground improvement techniques for stabilizing soft ground, landslides and slopes, and supporting deep excavations. The technical program highlights the state-of-practice, current research, innovations, advancements, and case histories of deep foundations, anchored earth retention, slurry walls, ground improvement, deep mixing. The popular software discussion will be held again this year: a featured interactive panel discussion that covers the effective use of software for analyzing slope and landslide stabilization and deep excavation projects.

On Tuesday, August 8, related DFI technical committees will hold committee meetings in the afternoon. All DFI committee meetings are open for anyone to attend. In the evening, DFI's Women in Deep Foundations Committee will hold a fundraising networking event, and all attendees are invited to join and participate. More details on the event will be posted shortly.

All S3 technical sessions are presented in plenary format and in depth discussion is encouraged. On Wednesday, August 9 and Thursday, August 10, keynote lecturers and other indus-

try experts will provide presentations on the latest analytical and design methods and practical applications.

Equipment, material and instrumentation suppliers, contractors, engineers, and other vendors will present their services in our Exhibit Hall.

Members from the following committees are collaborating to organize this event:

- Anchored Earth Retention
- Deep Foundations for Landslides and Slope Stabilization
- Drilled Shaft
- Ground Improvement
- Slurry Wall
- Soil Mixing
- Subsurface Characterization for Deep Foundations
- Testing and Evaluation

17ARC 17th Asian Regional Geotechnical Engineering Conference, 14-18 August 2023, Nur-Sultan, Kazakhstan, https://17arc.org

ISMLG 2023 – 4th International Symposium on Machine Learning & Big Data in Geoscience, 29 August - 1 September 2023, University College Cork, Ireland, www.ismlg2023.com

IS-PORTO 2023 8th International Symposium on Deformation Characteristics of Geomaterials, 3rd - 6th September 2023, Porto, Portugal, www.fe.up.pt/is-porto2023

SUT OSIG 9th International Conference "Innovative Geotechnologies for Energy Transition", 12-14 September 2023, London, UK, www.osig2023.com, www.sut.org

SAHC 2023 13th International Conference on Structural Analysis of Historical Constructions "Heritage conservation across boundaries", 12-15 September 2023, Kyoto, Japan, https://sahc2023.org/

XII ICG - 12th International Conference on Geosynthetics, September 17 – 21, 2023, Rome, Italy, www.12icg-roma.org

SEG23 Symposium on Energy Geotechnics, 3-5 October 2023, Delft, The Netherlands, https://seg23.dryfta.com

28th European Young Geotechnical Engineers Conference and Geogames
04 – 07 October 2023, Moscow, Russia

Organiser: Russian Society for Soil Mechanics, Geotechnics and Foundation Engineering

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2023 15th ISRM Congress, International Congress in Rock Mechanics Challenges in Rock Mechanics and Rock Engineering, 9÷14 October 2023, Salzburg, Austria, https://www.isrm2023.info/en/

ACUUS SINGAPORE 2023 18th Conference of the Associated Research Centers for the Urban Underground Space "Underground Space – the Next Frontier", 1 - 4 Nov 2023, Singapore, www.acuus2023.com

6th World Landslide Forum "Landslides Science for sustanaible development", 14 to 17 November 2023, Florence, Italy, https://wlf6.org

CREST 2023 – 2nd Construction Resources for Environmentally Sustainable Technologies, November 20-22, 2023, Fukuoka, Japan, https://www.ic-crest.com

GEOTEC HANOI 2023 The 5th International Conference on Geotechnics for Sustainable Infrastructure Development, December 14-15, 2023 - Hanoi, Vietnam, https://geotechn.vn

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

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

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

PANAMGEO CHILE 2024 17th Pan-American Conference on Soil Mechanics and Geotechnical Engineering, La Serena, Chile, https://panamgeochile2024.cl

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

Email: helmut.schweiger@tugraz.at

ΕΝΔΙΑΦΕΡΟΝΤΑ ΓΕΩΤΕΧΝΙΚΑ ΝΕΑ

The 1961 Kurenivka mudslide in Ukraine

On 13 March 1961 a very large landslide occurred in Kurenivka area of the city of Kyiv (Kiev) in Ukraine, although at the time it was a part of the Soviet Union. The location is 50.486, 30.473, although there is little evidence of the landslide now. The event is now known as the Kurenivka mudslide (or the Kyrenivka mudslide in some cases).

The landslide was the consequence of a strange and tragic set of circumstances. In September 1941, the Babyn Yar ravine at the top of the slope was the site of a Nazi atrocity in which 34,000 Jewish people were murdered. The site continued to be the location of the murder of Jewish and other people through the Nazi occupation; it is estimated that 100,000 people were killed there.

Upon recapture of the city, the Soviet authorities sought literally to cover up the tragedy by burying the site beneath a landfill. Subsequently, the ravine was filled with dense liquid waste from brick factories in the area.

Radio Free Europe has a good account of the events of 13 March 1961. The previous evening the pumping station at the dam that was retaining the waste failed. At 8:30 am the dam collapsed, releasing at least 600,000 cubic metres of waste (some reports indicate 4 million cubic metres), including brickworks waste, mud, water and (dreadfully) human remains. It is reported that landslide debris cascaded through the streets of Kurenivka for about two hours. The Wikipedia account describes the burial of "a residential area, *a tram depot, several industrial buildings and a cemetery, as well as traffic moving along the streets".*

The impact was devastating. At least 50 people were killed at the tram depot alone. The official toll is 145 people, but some investigations have suggested that 1,500 people lost their lives that morning.

Included in the Radio Free article about the Kurenivka mudslide are some archive images of the aftermath of the disaster. This pair of images provides an interesting view of the scale of the event:-

The aftermath of the 13 March 1961 Kurenivka mudslide in Ukraine.

In the aftermath of the landslide, the site was cordoned off by the Soviet authorities, and information about the disaster was suppressed. It appears that there was an attempt to pin the blame of the chair of the City Council, Alexei Iosifovich Davydov. He died in mysterious circumstances on 20 October 1965; the official version is that he committed suicide, although this is disputed.

The amount of detail available about the Kurenivka mudslide remains limited, and I suspect that there is little knowledge of this tragic event in the landslide community. It is a disaster that is worthy of further, detailed study amidst the ongoing tragedy in Ukraine.

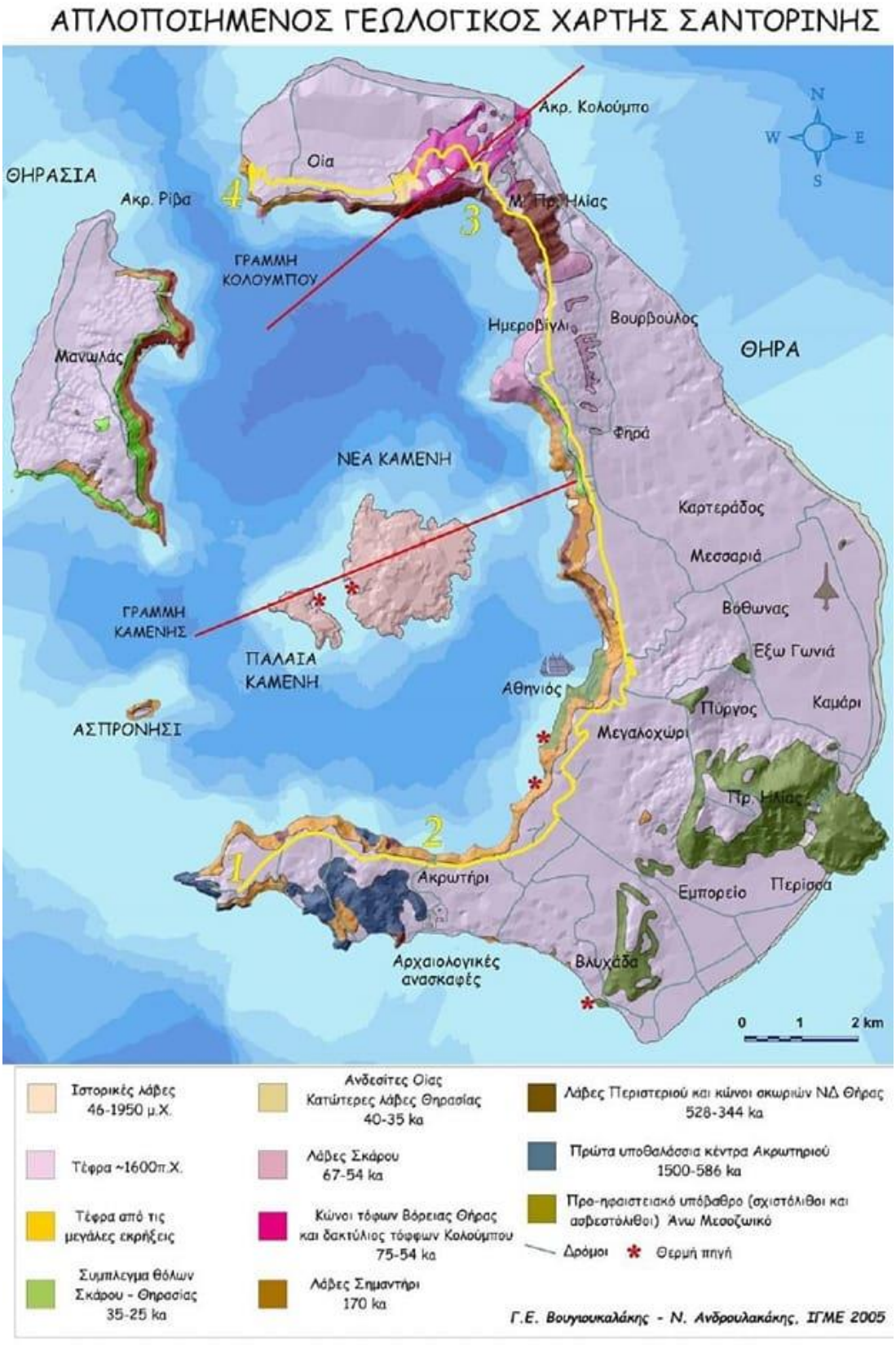
(Dave Petley / THE LANDSLIDE BLOG, 28 September 2022, https://blogs.agu.org/landslideblog/2022/09/28/the-1961-kurenivka-mudslide-in-ukraine/)

Κατέρρευσε το βουνό και σε 72 ώρες αποκαταστάθηκε ο δρόμος με ένα τετράγωνο!!!

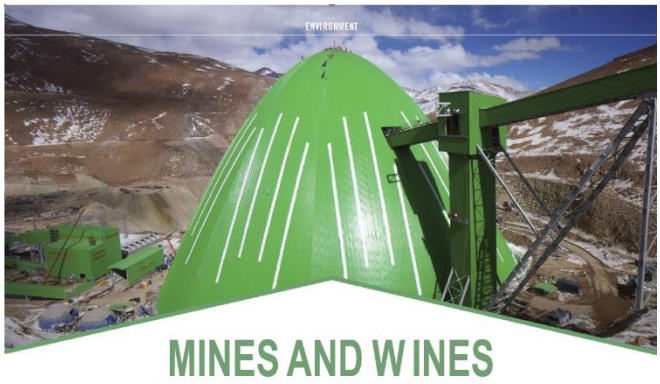
Κάπου στην Κίνα.

Σωτήρης Γκουντουβάς Facebook

ΕΝΔΙΑΦΕΡΟΝΤΑ - ΓΕΩΛΟΓΙΑ



ΕΝΔΙΑΦΕΡΟΝΤΑ - ΠΕΡΙΒΑΛΛΟΝ



Geometrica's bespoke Steel and Aluminum Domes are helping to settle age-old disputes between Wine Makers and Miners in Chile

One grows and maintains picturesque vineyards to produce fine Chilean wine enjoyed the world over the other scours the earth to dig up valuable gold, silver and copper. Though wildly different, the Chilean winemaking and mining industries are paramount to the country's $320.5bn (GDP} economy and must co-exist.

Once in dispute about the amount of dust from mines polluting vineyards, the two industries are now working alongside each other peacefully, thanks to engineers at dome-designing company Geometrica, creators of standard and bespoke domes capable of shutting in the dust.

Most mines in Chile that are located in winemaking regions now have some sort of Geometrica dome or 1freedome' to ensure winemaking neighbours aren't left with vineyards and water supplies that are covered in dirty mine dust.

Geometrica's Chile representative Juan Pablo Jijena speaks about the challenges of designing and constructing the dome structures in the arid Atacama Desert and lofty Chilean Andes.

Heidi Vella-Starr:

How did the idea for Carola Mine's 'Freedom' come about?

Juan Pablo Jijena, Chile Representative for Geometrica

Carola mine is very old and has grown organically over time. It is located in a fertile valley in a region of the Atacama Desert in northern Chile. This valley is very prolific in vineyards and the mining plant is located precisely in the midst of a vast area of vineyards that are permanently contaminated with dust emanating from the production process of the mining plant, resulting in constant claims from farmers in the affected area.

By mid-2010, the Carola mine contacted us to evaluate an overall solution for the problem of pollution emanating from the plant.

We identified three highly polluting plants on the ground these we covered with bullet circular domes and a central, irregular shaped area was covered by the freedome.

In addition to permanently solving the problem of pollution at a lower cost with a highly aesthetic product, our freedome was built without stopping the operation of the plant, which undoubtedly was a significant advantage over other alternatives.

The project began in 2011 and engineering and design took around three months and construction about eight months.

What were the main challenges of the project?

Undoubtedly the greatest challenge was in the design and engineering. Several long studies found different alternatives suitable to cover the selected space, but there were many issues to fight against when the freedome was being built; such as the limited space on the ground, as the freedome needed to rise up from the floor.

What was the cost of the dome at the Carola mine?

Regarding value, I cannot disclose the cost of the agreements we made to our customer.

However, it is a solution with an excellent cost benefit ratio, and has been implemented in virtually all Chilean mines.

Can you tell us more about the construction project?

The freedome was built with local labour, with the continued assistance from a geometrical engineer and with a strict adherence to our procedures and plans of assembling, which were prepared for the environmental conditions and resources available for this particular work.

There were several challenges to overcome to achieve the construction of the freedome.

First, the plant continued to operate while the dome was assembled, which meant a very hostile environment for workers, mainly dust in suspension. Given the large number of projects carried out in the region there was very little available labour, so it was very difficult to get workers. Since there were several significant interferences with existing structures, it was necessary to have large steel frames to support the dome, which were mounted by cranes with very little room to manoeuvre.

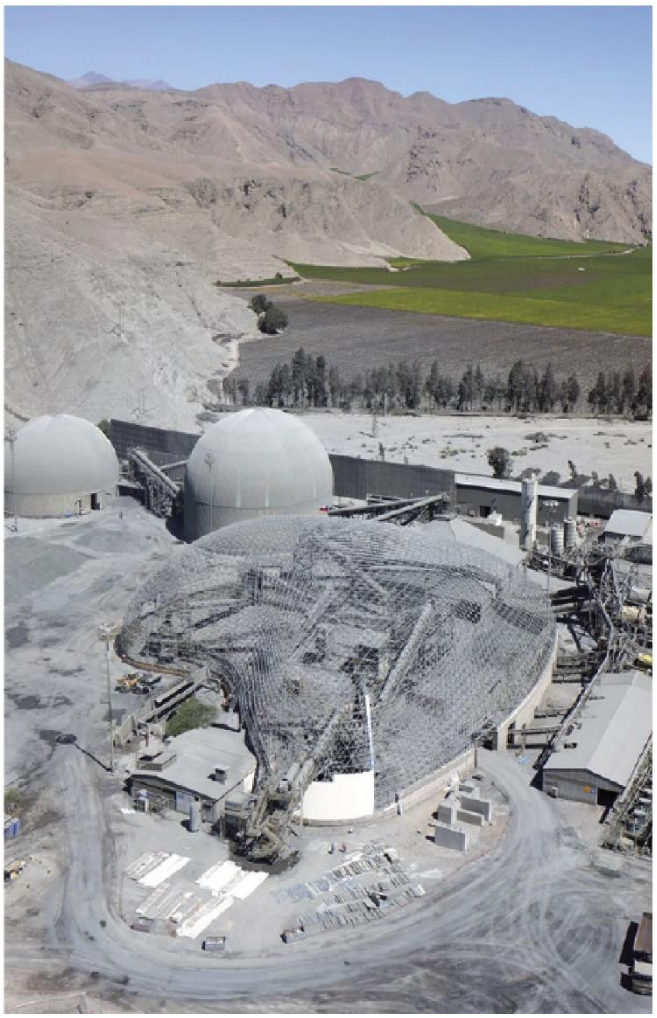
What about the project at Minera Lumina Copper Chile in the Chilean Andes?

Geometric has built several domes in the Andes, and in particular the mining dome at Caserones was 4000 meters above sea level, which was a major challenge, primarily because of its size and diameter - it is 143m by 90m high.

It was a challenge also because of the environmental conditions, such as frequent snow, extreme cold, high winds, adverse topography, and difficult access and reduced working space. There were also inadequate occupational health conditions due to low oxygen in the air, which strongly hindered the performance of workers.

The dome was required to cover the stack of thick copper ore.

The construction of the dome took around twelve months and was assembled by a local contractor, assisted by a team of engineers from Geometrica.



What is the maintenance requirement and lifespan?

Domes are coated in galvanized steel and painted on both sides with polyester paint. They also have corrosion protection and are designed to greatly exceed the useful life of the project.

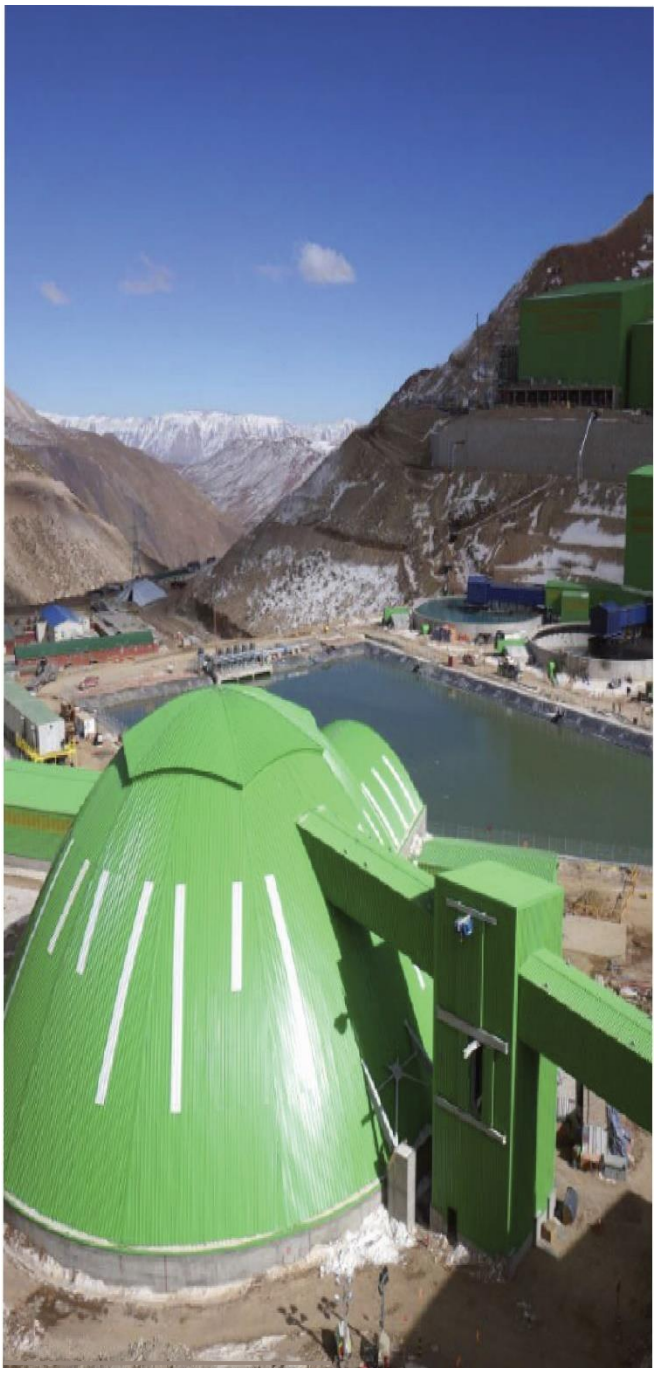
Do the domes require special ventilation?

Ventilation is generally not required because workers enter the dome only when the stockpile is not running or for very short inspections. Ventilation would al low the dust to clear out of the dome and pollute the environment.

What feedback has Geometrica received about the domes?

Workers who have built our domes are highly motivated to work with a unique structural system that is modern and much admired.

In general our customers are very pleased, not only by the results but also by the way we carry out the various stages of the project, from engineering, manufacturing, assembly and support. We are a boutique industry strongly oriented to our customers.



(mine, Issue 26, October 2014, http://www.nridigital.com/mine-digital-magazine.html)

ΝΕΕΣ ΕΚΔΟΣΕΙΣ ΣΤΙΣ ΓΕΩΤΕΧΝΙΚΕΣ ΕΠΙΣΤΗΜΕΣ

Ελληνική Γεωμυθολογία (Πρώτο Βιβλίο)

Εισαγωγή στη Γεωμυθολογία - Γεωλογικό και Φυσικογεωγραφικό Δυναμικό

Μαριολακος Δ. Ηλιας

Όλοι σχεδόν έχουν αποδεχθεί ότι η ελληνική μυθολογία είναι ένα γοητευτικό παραμύθι που δεν έχει καμία απολύτως σχέση με την προϊστορική πραγματικότητα.

Η συστηματική μελέτη όμως της εξέλιξης του κλίματος κατά τα τελευταία 18.000 χρόνια κυρίως και των επιπτώσεων του στον αιγαιακό και στον υπόλοιπο ευρωπαϊκό χώρο έδειξε ότι η πρώιμη πολιτισμική εξέλιξη των κατοίκων των περιοχών γύρω από την Ανατολική Μεσόγειο και το Αιγαίο συνδέεται άμεσα με τις ευνοϊκές κλιματικές συνθήκες, την ίδια εποχή που στην υπόλοιπη Ευρώπη, βόρεια των οροσειρών των Πυρηναίων και των Άλπεων, επικρατούσε το ψύχος (παγετώδης περίοδος).

Αποδείχθηκε ακόμη ότι η γενεαλογική εξέλιξη των θεών, όπως μας την έχει κληροδοτήσει ο Ησίοδος, ακολουθεί την παλαιογεωγραφική εξέλιξη του Αιγαίου κατά την περίοδο μεταξύ 18.000 και 6.000 χρόνων πριν από σήμερα.

Στο βιβλίο αυτό αναδύονται συνοπτικά η φυσικογεωλογική εξέλιξη του ευρύτερου αιγαιακού χώρου, καθώς επίσης και ορισμένες από τις πρώτες τεχνολογικές δραστηριότητες των προϊστορικών κατοίκων του.

Ελληνική Γεωμυθολογία (Δεύτερο Βιβλίο)

Οι Θεοί Των Ελλήνων Μέχρι Την Τρίτη Γενιά

Μαριολακος Δ. Ηλιας

Μετά το κοσμογονικό στάδιο -Χάος, Γαία, Ουρανός-, τον δημιουργικό Έρωτα και ορισμένα φυσικογεωγραφικά στοιχεία του ελλαδικού χώρου, όπως όρη, πόντος κ.ά., έρχεται η τρίτη γενιά, Τιτάνες, Γίγαντες κ.ά., που κυριαρχεί μέχρι την εποχή της Τιτανομαχίας.

Στη συνέχεια οι τρεις μεγάλοι Τιτάνες, Ωκεανός, Άτλας και Κρόνος, ανοίγουν τους διηπειρωτικούς και υπερπόντιους δρόμους για την εξάπλωση των Πρωτο-Ελλήνων αρχικά και των προϊστορικών Ελλήνων στη συνέχεια στα πέρατα του κόσμου.

Άλλοτε από αναφορές και άλλοτε από αρχαιολογικά ευρήματα, αποδεικνύεται η παρουσία των προϊστορικών Ελλήνων από τη χώρα των Υπερβορείων μέχρι τους Αιθίοπες και από τις Ινδίες μέχρι "...την μεγάλην ήπειρον, ὑφ' ης η μεγάλη περιέχεται κύκλω θάλαττα..." (Πλούταρχος), δηλαδή τη Βορειοανατολική Αμερική.

Ελληνική Γεωμυθολογια (Τρίτο Βιβλίο)

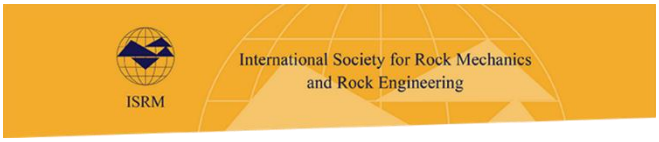
Νεότερες Γενιές Θεών Και Ήρωες Ελλήνων Και Γειτονικών Λαών

Μαριολακος Δ. Ηλιας

Στο τρίτο βιβλίο περιγράφονται οι δραστηριότητες των θεών της 4ης γενιάς, σύμφωνα με το γενεαλογικό δένδρο του Ησιόδου, και η σχέση τους με το γεωπεριβάλλον, ξεκινώντας από τους θεούς-ποταμούς και τους έξι μεγάλους θεούς και τις θεές του Ολύμπου. Ακολουθούν οι θεοί των νεότερων γενεών και τελικά οι διάφοροι ήρωες. Ιδιαίτερη σημασία δίδεται στους ήρωες προπάτορες των Ελλήνων, όπως και σε άλλους λιγότερο γνωστούς ή εντελώς αγνοημένους, όπως ο Παλαμήδης και ο Αγχίσης, καθώς και σε πολλούς που μέσω των δραστηριοτήτων τους αποδεικνύεται η καθοριστική συμβολή των προϊστορικών Ελλήνων στη διαμόρφωση αρχικά του Αρχαιοελληνικού πολιτισμού και στη συνέχεια του Ευρωπαϊκού και γενικότερα του Δυτικού. Στο βιβλίο καταβλήθηκε προσπάθεια να δοθεί απάντηση στα ερωτήματα που σχετίζονται με τη γένεση των θεών, και συγκεκριμένα με το «πότε» και «για ποιους λόγους» δημιουργήθηκαν οι συγκεκριμένες γενεές των θεών, συνδέοντάς τες με τις καθοριστικής σημασίας κλιματικές μεταβολές και τις συγκλονιστικές επιπτώσεις στη γεωπεριβαλλοντική εξέλιξη του ευρύτερου Αιγαιακού χώρου κατά τα τελευταία 18.000 χρόνια, που είναι -στις λεπτομέρειές της- μοναδική σε ολόκληρο τον πλανήτη. Παράλληλα, γίνεται αναφορά και στις θεογονίες των διαφόρων λαών που κατοικούσαν γύρω από την Ανατολική Μεσόγειο (Σουμέριοι, Βαβυλώνιοι, Χετταίοι, Αιγύπτιοι, Ισραηλίτες) και ανέπτυξαν και αυτοί σημαντικούς πολιτισμούς κατά την προϊστορική κυρίως εποχή.

(Εκδόσεις ΛΙΒΑΝΗΣ, 2022)

ΗΛΕΚΤΡΟΝΙΚΑ ΠΕΡΙΟΔΙΚΑ



ISRM Newsletter No. 59 - September 2022

Κυκλοφόρησε το Τεύχος Αρ. 59 Σεπτεμβρίου 2022 της ISRM με τα ακόλουθα περιεχόμενα:

- Message from the President
- Welcome to the ISRM 2022 International Symposium – LARMS IX, Asunción, Paraguay, 16-19 October 2022
- 15th International ISRM Congress, Salzburg, Austria – deadline for submission of abstracts is now 31 October 22
- 39th ISRM online lecture by Prof. Bruce Hebblewhit
- 12th Asian Rock Mechanics Symposium - ARMS12, Hanoi, Vietnam, 22-26 November
- AusRock 2022, Melbourne, 29 November-1 December - an update
- CouFrac 2022, 14-16 November, Berkeley, California, USA
- Workshop of the Commission on Testing Methods in Eurock 2022, Helsinki
- ISRM Rocha Medal 2024 - nominations to be received by 31 December 2022
- ISRM Sponsored Conferences

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

IGS NEWSLETTER – September 2022

Helping the world understand the appropriate value and use of geosynthetics

www.geosyntheticssociety.org/newsletters

- New IGS Council Sets Ambitious Agenda READ MORE
- Focus On Sustainability At IGS Special Session READ MORE
- Geosynthetics Event at the ICID Congress and Irrigation Australia Conference READ MORE
- Request for Proposal: Sustainability Benefit Calculator READ MORE
- GeoAfrica 2023 - Deadline for full paper submission is 1 October READ MORE
- Register Now for GeoAsia7 - Hybrid Event READ MORE
- Chapters: Join The IGS Job Shadowing Program READ MORE; SEE BROCHURE
- Give IGS Photo Contest Your Best Shot READ MORE
- 10 Questions With… Departing IGS President Chungsik Yoo READ MORE
- Bumper Young Members Program At 13th ICG READ MORE
- Sustainability eBook Now In Arabic! READ MORE
- IGS Awards: Call for Nominations 2018 – 2021 READ MORE
- Upcoming Webinars
  - The Yeager Airport Reinforced Slope, September 20 at 1pm EST (GMT-4), Presented by Bob Bachus REGISTRATION INFORMATION
  - An Approach to High-Density Polyethylene (HDPE) Geomembrane Selection for Challenging Design Requirements, October 25, repeated on October 26, Presented by Dr. Fady B. Abdelaal REGISTRATION INFORMATION
- Calendar of Events

ΕΚΤΕΛΕΣΤΙΚΗ ΕΠΙΤΡΟΠΗ ΕΕΕΕΓΜ (2019 – 2023)

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ΕΕΕΕΓΜ

Τομέας Γεωτεχνικής
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ΕΘΝΙΚΟΥ ΜΕΤΣΟΒΙΟΥ ΠΟΛΥΤΕΧΝΕΙΟΥ
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