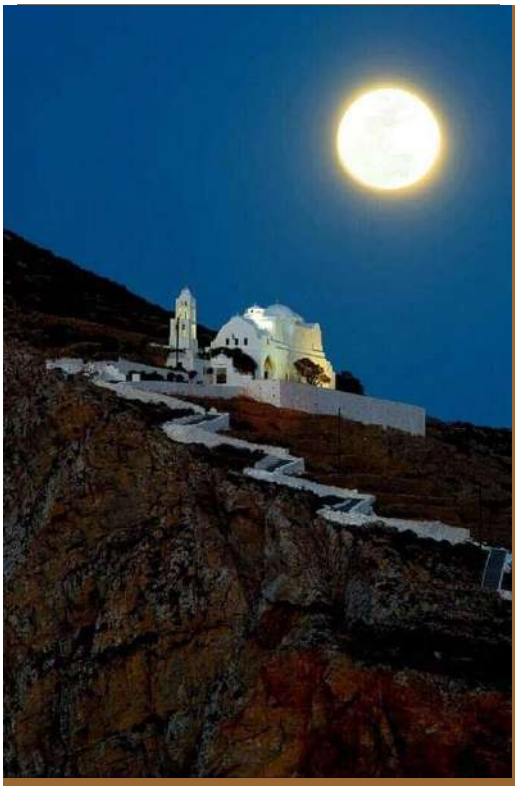

Φολέγανδρος

Αρ. 151 – ΙΟΥΝΙΟΣ 2021

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ΕΤΑΙΡΕΙΑ
ΕΔΑΦΟΜΗΧΑΝΙΚΗΣ
& ΓΕΩΤΕΧΝΙΚΗΣ
ΜΗΧΑΝΙΚΗΣ

Τα Νέα της Ε Ε Ε Ε Γ Μ

151

Ζάκυνθος, παραλία Ναυάγιο

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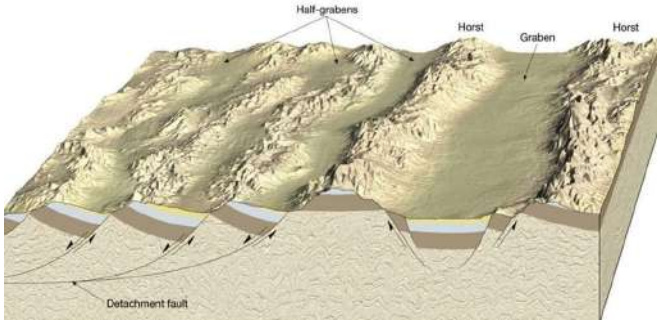

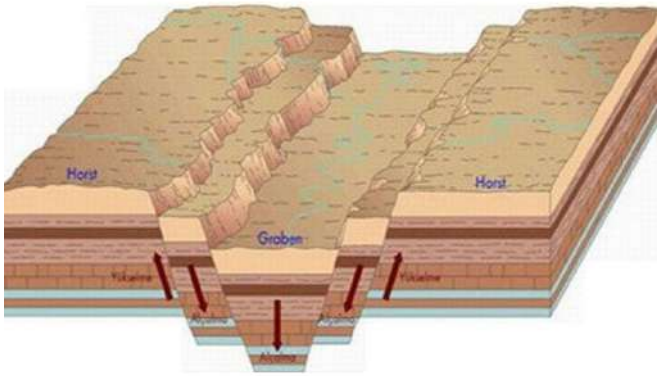

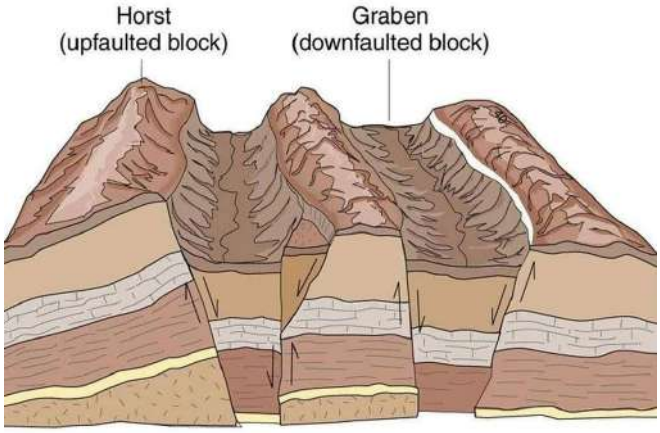

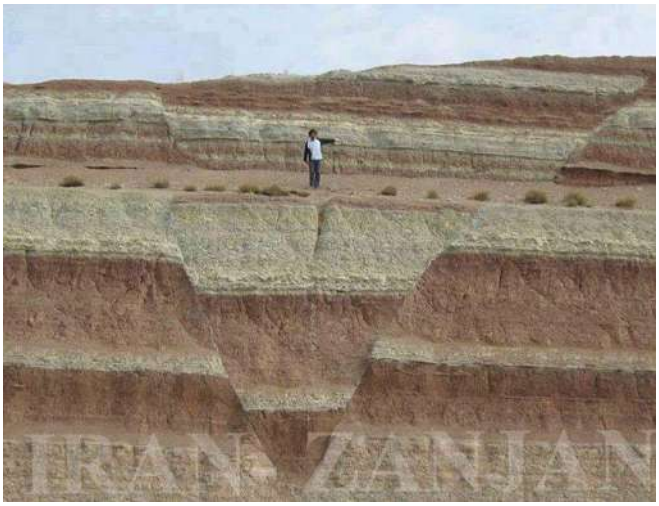

ΕΚΔΗΛΩΣΕΙΣ ΕΕΕΕΓΜ

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14 Ιουλίου 2021, 18:00
Διαδικτυακή Διάλεξη

Δρ. Πάνου Ντακούλα
Καθηγητή Πανεπιστημίου Θεσσαλίας

Θερμικός λυγισμός υπόγειων χαλύβδινων αγωγών φυσικού αερίου: αλληλεπίδραση εδάφους – αγωγού

Περίληψη Διάλεξης

Οι αγωγοί που μεταφέρουν φυσικό αέριο είναι δυνατόν να υποστούν κατακόρυφο λυγισμό λόγω των σημαντικών θλιπτικών τάσεων που αναπτύσσονται εξαιτίας της υψηλής θερμοκρασίας και εσωτερικής πίεσης του μεταφερόμενου ρευστού. Η παρουσίαση διερευνά το φαινόμενο εμφάνισης θερμικού λυγισμού, λαμβάνοντας υπόψη την αλληλεπίδραση εδάφους-αγωγού. Το πρώτο τμήμα της έρευνας που εκπονήθηκε με συνεργασία του Π.Θ. και ΕΜΠ, αφορά οριζόντιους αγωγούς και βασίζεται σε αριθμητικές προσομοιώσεις και φυσικά πειράματα υπό κλίμακα. Αρχικά, εξετάζεται πειραματικά η αντίσταση του εδάφους σε ανύψωση υπόγειου αγωγού για διαφορετικές τιμές της διαμέτρου, του βάθους εγκιβωτισμού, και της σχετικής πυκνότητας της άμμου. Στην συνέχεια εξετάζεται πειραματικά η ανάπτυξη κατακόρυφου λυγισμού, για διαφορετικά βάθη εγκιβωτισμού. Παρουσιάζονται συγκρίσεις πειραματικών μετρήσεων και αριθμητικών προβλέψεων. Ακολουθεί λεπτομερής αριθμητική προσομοίωση του κατακόρυφου λυγισμού για αγωγούς εντός αργιλικών και αμμωδών εδαφών. Εξετάζεται η επίδραση αρχικών γεωμετρικών ατελειών, της αντοχής του εδάφους, και της εσωτερικής πίεσης στις κρίσιμες θερμοκρασίες ανάπτυξης λυγισμού. Στο δεύτερο τμήμα της παρουσίασης, διερευνάται η ανάπτυξη κατακόρυφου λυγισμού σε αγωγούς διερχόμενους από κεκλιμένο έδαφος για ένα ευρύ φάσμα κλίσεων πρανών. Παρουσιάζονται αντιπροσωπευτικά αποτελέσματα παραμετρικών αναλύσεων αναφορικά με την αντοχή του εδάφους, την εσωτερική πίεση, τα χαρακτηριστικά του αγωγού και το βάθος εγκιβωτισμού.

Σύντομο Βιογραφικό Σημείωμα Ομιλητή

Ο Δρ. Πάνος Ντακούλας είναι Καθηγητής στο Τμήμα Πολ. Μηχανικών του Παν. Θεσσαλίας. Έλαβε δίπλωμα Πολ. Μηχανικού από το ΕΜΠ (1980), και MSc και Διδακτορικό (1985) από το Rensselaer Polytechnic Institute (NY). Διατέλεσε Επίκουρος και Αναπληρωτής Καθηγητής (1987-2000) στο Πανεπιστήμιο Rice (Χιούστον), ενώ από το 2001 είναι μέλος ΔΕΠ του ΠΘ. Η έρευνά του επικεντρώνεται στην Εδαφοδυναμική και Γεωτεχνική Σεισμική Μηχανική, με εφαρμογές στην σεισμική συμπεριφορά φραγμάτων και λιμενικών συστημάτων, την πειραματική συμπεριφορά εδάφους σε ανακυκλική φόρτιση, την ρευστοποίηση, την δημιουργία καταστατικών προσομοιωμάτων εδάφους, την αλληλεπίδραση εδάφους-αγωγών και την προχωρημένη αριθμητική ανάλυση. Διατέλεσε πρόεδρος της Εθνικής Επιτροπής Σεισμικής Μηχανικής (Γεωτεχνικού Τομέα) του Συλλόγου Πολιτικών Μηχανικών των ΗΠΑ (1992-2000) και μέλος της Εκδοτικής Επιτροπής του περιοδικού Geotechnical and Geoenvironmental Engineering (ASCE). Για το ερευνητικό έργο του τιμήθηκε με το διεθνές βραβείο Prakash (1995) και με το βραβείο Hsieh (2009) του Συλλόγου Πολ. Μηχανικών της Μεγάλης Βρετανίας. Έχει δημοσιεύσει άνω των 120 επιστημονικών άρθρων σε διεθνή περιοδικά και πρακτικά συνεδρίων και διετέλεσε εκδότης σε πρακτικά συνεδρίων. Έχει συμμετάσχει σε ένα σημαντικό αριθμό ερευνητικών έργων και διατέλεσε σύμβουλος σε μεγάλα τεχνικά έργα.

NTUA Civil Engineering School ranked 4th globally, 2021

The Civil Engineering School of the National Technical University of Athens was **ranked 4th globally (2nd in Europe)** according to ShanghaiRanking's Global Ranking of Academic Subjects (GRAS) 2021, being the best performance of any Higher Education School in Greece. The GRAS use a range of objective academic indicators and third-party data to measure the performance of world universities in respective subjects, including research output, research influence, international collaboration, research quality, and international academic awards. NTUA road safety activities have contributed to this ranking.

(June 7th, 2021, https://www.nrso.ntua.gr/ntua-civil-engineering-school-ranked-4th-in-europe-2021/)

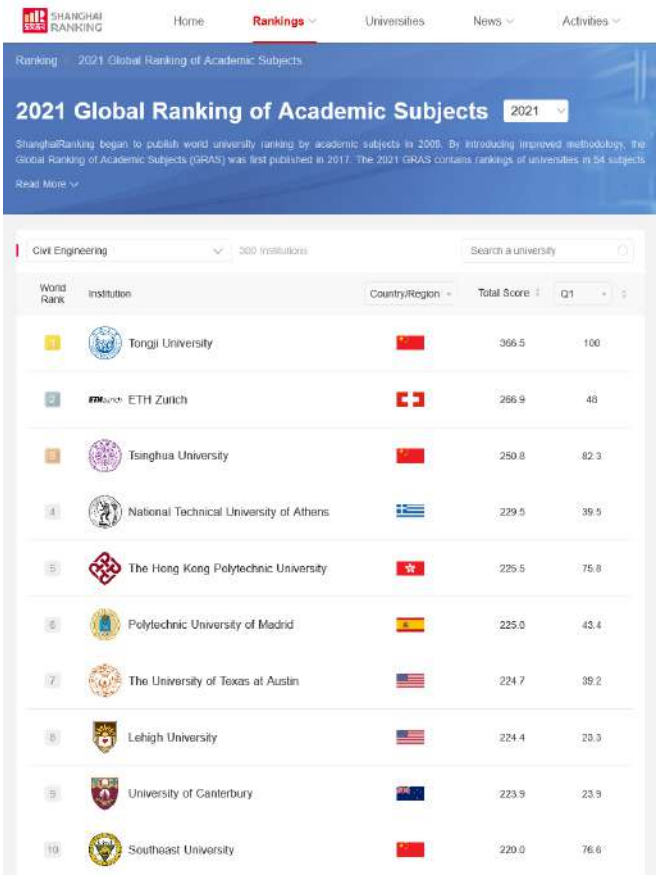
Κατάταξη 2021: Η Σχολή Πολιτικών Μηχανικών 4η παγκοσμίως και 2η στην Ευρώπη

Η Σχολή Πολιτικών Μηχανικών 4η παγκοσμίως και 2η στην Ευρώπη σύμφωνα με την Λίστα Σαγκάης 2021.

Στην κατάταξη της Σαγκάης (Shanghai Ranking) του 2021, το ΕΜΠ σημείωσε διακρίσεις, με εξέχουσα αυτή στο αντικείμενο του Πολιτικού Μηχανικού. Συγκεκριμένα το ΕΜΠ είναι 4ο στην παγκόσμια κατάταξη στο συγκεκριμένο αντικείμενο και 2ο στην Ευρώπη.

Σημειώνεται πως στο αντικείμενο του Πολιτικού Μηχανικού, το ΕΜΠ ήταν πάντα ψηλά στις διεθνείς κατατάξεις, έχοντας την 7η θέση στην κατάταξη της Σαγκάης για τα τρία προηγούμενα χρόνια και παραμένοντας στους 50 πρώτους για πολλά χρόνια στην κατάταξη του QS. Αλλά είναι η πρώτη φορά που εμφανίζεται στους παγκοσμίως κορυφαίους πέντε.

Ο Πρύτανης του ΕΜΠ κ. Ανδρέας Μπουντουβής αναφέρει: «Πρόκειται για σημαντικό επίτευγμα του ΕΜΠ και ιδιαίτερη προβολή της χώρας, αφού πρώτη φορά στην ιστορία των παγκόσμιων αξιολογήσεων και κατατάξεων των πανεπιστημίων, μια σχολή απ' την Ελλάδα κατατάσσεται στην πρώτη πεντάδα. Το ΕΜΠ φιλοδοξεί και έχει το δυναμικό να φτάσει πολύ ψηλά. Με προσήλωση στην εξωστρέφεια, σκληρή δουλειά κι επίμονη προσπάθεια για αντιμετώπιση της δυσπραγίας και της οπισθοδρόμησης, επιδίωξη της αριστείας και διεκδίκηση της αναγνώρισής της και ατζέντα δυναμικής παρουσίας στην αιχμή των διεθνών επιστημονικών εξελίξεων, οι δημιουργικές δυνάμεις του ΕΜΠ θα επιτύχουν εξαιρετικούς στόχους».



Ο Κοσμήτορας της Σχολής Πολιτικών Μηχανικών κ. Νίκος Λαγαρός σημειώνει: «Μας ενθουσιάζει το αποτέλεσμα αυτό, το οποίο μας δίνει κουράγιο να συνεχίζουμε τις προσπάθειές μας για υψηλής ποιότητας διδασκαλία και έρευνα, και για αξιοκρατία σε πλαίσιο δημοκρατικής λειτουργίας και διαφάνειας. Και έρχεται σε μια στιγμή που χρειαζόμαστε μια διεθνή ηθική επιβράβευση, αφού η χώρα μας όχι απλά δεν μας επιβραβεύει, αλλά τα μέτρα που έχει πάρει την τελευταία δεκαετία έχουν πλήξει τη Σχολή Πολιτικών Μηχανικών όσο καμιά άλλη. Το καθηγητικό προσωπικό μας έχει μειωθεί στο μισό και ο προϋπολογισμός μας στο ένα δέκατο!».

Η κατάταξη της Σαγκάης του 2021 περιέλαβε 54 γνωστικά αντικείμενα στο χώρο των φυσικών επιστημών, της τεχνολογίας, των βιοεπιστημών, των ιατρικών επιστημών και των κοινωνικών επιστημών. Εξέτασε 4000 πανεπιστήμια από 93 χώρες και στους πίνακες της κατάταξης περιέλαβε πάνω από 1800 απ' αυτά. Για την ποσοτικοποίηση της επίδοσης των πανεπιστημίων ανά τον κόσμο χρησιμοποίησε πέντε ακαδημαϊκούς δείκτες και συγκεκριμένα αυτούς των ερευνητικών δημοσιευμάτων (Q1), της ερευνητικής επιρροής (CNCI), της διεθνούς συνεργασίας (IC), της ποιότητας της έρευνας (TOP) και των διεθνών ακαδημαϊκών βραβείων (AWARD).

Ἐντεκα Ελληνικά Πανεπιστήμια περιλαμβάνονται στην κατάταξη, όπως φαίνεται στον πρώτο πίνακα, με το ΕΜΠ να κατέχει τα πρωτεία στις επιδόσεις.

Εκτός απ' το αντικείμενο του Πολιτικού Μηχανικού, το ΕΜΠ εμφανίζεται σε άλλα 14 αντικείμενα, όπως δείχνει ο δεύτερος πίνακας, που περιλαμβάνει και σύγκριση με άλλα 4 πανεπιστήμια που θεραπεύουν αντίστοιχες περιοχές.

Τις τέσσερις καλύτερες επιδόσεις, μετά απ' αυτές στο αντικείμενο του Πολιτικού Μηχανικού, το ΕΜΠ τις έχει στη θαλάσσια τεχνολογία, στους υδατικούς πόρους, στην τεχνολογία μεταφορών και στον αυτοματισμό και έλεγχο. Αυτά τα αντικείμενα

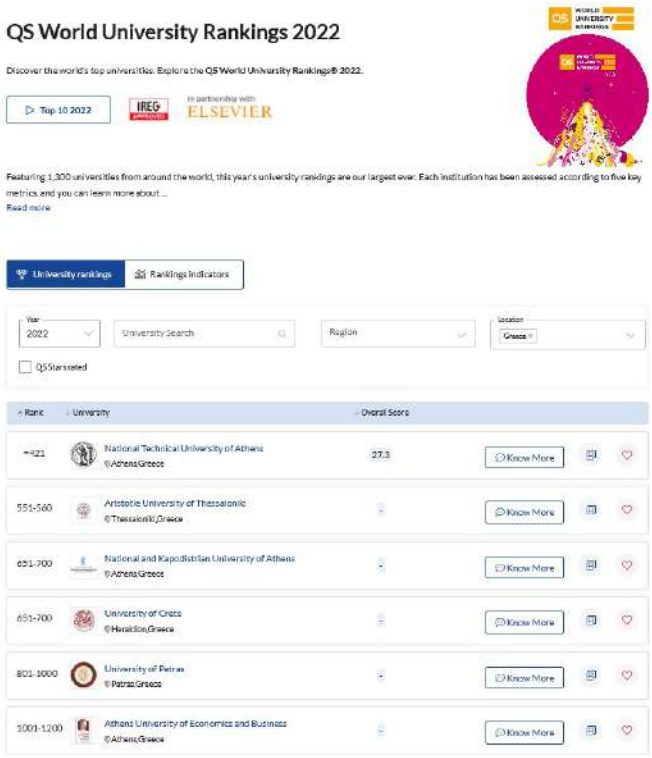
είναι διατμηματικά, αλλά είναι χαρακτηριστικό ότι τα δύο απ' αυτά (υδατικοί πόροι, τεχνολογία μεταφορών) θεραπεύονται πρωτίστως απ' τη Σχολή Πολιτικών Μηχανικών, η οποία συμμετέχει σε ένα ακόμη απ' τα τέσσερα (θαλάσσια τεχνολογία, στο οποίο τα πρωτεία έχει η Σχολή Ναυπηγών Μηχανολόγων Μηχανικών).

Ανώτατο Εκπαιδευτικό Ίδρυμα	Καλύτερη επίδοση και αντίστοιχο αντικείμενο/Τμήμα/Σχολή	Αριθμός αντικειμένων με διάκριση
Εθνικό Μετσόβιο Πολυτεχνείο	**4** (Πολιτικών Μηχανικών)	15
Πανεπιστήμιο Κρήτης	**51-75** (Δημόσιας υγείας)	8
Αριστοτέλειο Πανεπιστήμιο Θεσσαλονίκης	**76-100** (Τεχνολογίας τηλεπικοινωνιών)	22
Εθνικό και Καποδιστριακό Πανεπιστήμιο	**101-150** (Φυσικής, Οδοντιατρικής, Νοσηλευτικής)	15
Πανεπιστήμιο Θεσσαλίας	**101-150** (Κτηνιατρικής)	4
Γεωπονικό Πανεπιστήμιο Αθηνών	**101-150** (Τροφίμων και Διατροφής)	4
Πανεπιστήμιο Πατρών	**151-200** (Πολιτικών Μηχανικών)	8
Οικονομικό Πανεπιστήμιο Αθηνών	**201-300** (Διοίκησης Επιχειρήσεων)	2
Πανεπιστήμιο Ιωαννίνων	**301-400** (Φυσικής)	3
Χαροκόπειο Πανεπιστήμιο	**401-500** (Επιστημών Υγείας & Αγωγής)	1
Πανεπιστήμιο Πειραιά	**301-400** (Οικονομικής Επιστήμης)	1

Είναι ακόμη ενδιαφέρον το γεγονός ότι το ΕΜΠ διακρίνεται και σε αντικείμενα τα οποία δεν ανήκουν στο κύριο σώμα των διδασκόμενων επιστημονικών περιοχών του, όπως στην ατμοσφαιρική και στην οικονομική επιστήμη.

Ας σημειωθεί ότι το ΕΜΠ δεν έχει ανάλογες επιδόσεις όταν αξιολογείται ως σύνολο χωρίς διάκριση αντικειμένου. Ο λόγος είναι πως είναι μικρό πανεπιστήμιο με επιλεγμένη (τεχνολογική) κάλυψη του όλου χώρου των επιστημών και με μόνο 9 Τμήματα (Μονοτμηματικές Σχολές). Αντίστοιχα, το Αριστοτέλειο και το ΕΚΠΑ έχουν πολλαπλάσια τμήματα το καθένα. Είναι επομένως αναμενόμενο το ΕΜΠ να κατατάσσεται, και στη συγκεκριμένη κατάταξη της Σαγκάης, κάτω απ' αυτά τα δύο, όταν αξιολογείται ως σύνολο. Η δύναμη και η ποιότητά του αναδεικνύονται όταν εξετάζεται ανά αντικείμενο, όπως δείχνουν τα παραπάνω στοιχεία.

Παρόλα αυτά σε άλλες κατατάξεις βρίσκεται να είναι το πρώτο πανεπιστήμιο της χώρας, όπως στην πολύ πρόσφατη κατάταξη του Οργανισμού QS για το έτος 2022. Το ΕΜΠ, όχι μόνο κατατάσσεται πρώτο στην Ελλάδα, αλλά είναι και το μόνο Ελληνικό ΑΕΙ στα πρώτα 500 του κόσμου, όπως φαίνεται στην εικόνα.



Foititikanea.gr, Σάββατο, 12 Ιουνίου 2021, https://www.foititikanea.gr/πανεπιστήμια/εθνικό-μετσόβιο-πολυτεχνείο/23132-κατάταξη-2021-η-σχολή-πολιτικών-μηχανικών-4η-παγκοσμίως-και-2η-στην-ευρώπη

Αντικείμενο/ Τμήμα/Σχολή	Εθνικό Μετσόβιο Πολυτεχνείο	Πανεπιστήμιο Κρήτης	Αριστοτέλειο Πανεπιστήμιο Θεσσαλονίκης	Εθνικό και Καποδιστριακό Πανεπιστήμιο	Πανεπιστήμιο Πατρών
Πολιτικών Μηχανικών	4	151-200			201-300
Θαλάσσιας Τεχνολογίας	41				
Υδατικών Πόρων	151-200				
Τεχνολογίας μεταφορών	151-200				
Αυτοματισμού και ελέγχου	151-200		151-200		
Ηλεκτρολόγων - Ηλεκτρονικών Μηχανικών	201-300		151-200	401-500	301-400
Ατμοσφαιρικής επιστήμης	201-300	151-200	151-200	201-300	201-300
Ενεργειακής τεχνολογίας	201-300		301-400		
Χημικών Μηχανικών	201-300				
Φυσικής	201-300		401-500	101-150	
Τεχνολογίας τηλεπικοινωνιών	201-300		76-100	201-300	
Μηχανολόγων Μηχανικών	301-400		301-400		201-300
Μαθηματικών	301-400	201-300			
Οικονομικής επιστήμης	301-400				
Μηχανικών Υπολογιστών	401-500				

Learning from Carmont

Although the Rail Accident Investigation Branch (RAIB) has yet to produce its final report on the fatal train crash at Carmont on 12 August 2020, there are now clear lessons about earthworks and weather management from this tragic event.

Network Rail's earthworks assets comprise 70,000 soil cuttings, 20,000 rock cuttings and 100,000 embankments. Most are over 150 years old and were built when there was little understanding of the science of soil mechanics. As a result, cuttings were overly steep, embankments uncompacted and drainage inadequate. Furthermore, earthworks are more vulnerable to changing weather patterns, resulting in longer periods of prolonged, intense rainfall and hotter, drier summers.

Since 2004, there has been an average of 100 earthworks failures per year; yet, in CP6 – up to 30 November 2020 – the annual average was 222. Nevertheless, there has been a significant reduction in high-consequence earthworks failures and derailments since 2004. Unfortunately, the single CP6 earthworks derailment was last year's fatal Carmont accident.

Carmont cutting stabilisation works.

This reduction follows increasing earthworks expenditure which, in 2010, included work to stabilise the steep Carmont cutting and install a crest drain immediately adjacent to the derailment site, as reported in Rail Engineer (Issue 77, March 2011). This explained how, partly due to an increase in the area of farmland and reduced effectiveness of the field drains, drainage run-off from the fields above had overtopped and was destabilising the cutting.

Interim reports

On 1 September 2020, Network Rail published its interim report on the Carmont derailment which explained the company's procedures for earthworks management. It noted that, although £1.3 billion is being spent on earthworks in CP6, it is not practicable to rebuild thousands of miles of earthworks to modern standards, so failures are still to be expected. It also detailed immediate actions taken to mitigate this risk including additional precautions for managing earthworks and operating trains during severe weather.

The report also specified the remits for two task forces led by independent experts. One, under Lord Robert Mair, reviewed the management of earthworks whilst another, led by Dame Julia Slingo, considered weather forecasting. Published in March, these reports aimed to ensure that Network Rail has the expertise, technology and systems to better manage earthworks, and make the best use of weather data.

RAIB's interim report, published on 19 April 2021, highlighted the sad irony of the derailment being caused by a failed crest drain, installed to protect the cutting. The train had collided with stones washed onto the track from this steeply-sloping gravel-filled drain into which the local topography had directed large amounts of water after 51mm of rain had fallen in three hours, 75% of the area's average monthly rainfall.

The RAIB investigation had found that the missing gravel had exposed a buried drain pipe for 8 metres upslope of a catchpit where the drain was under a steep gorse-covered slope. RAIB found that this part of the drain was not in Network Rail's drain maintenance database and was unable to find evidence of it being inspected between its construction and the accident.

A train derailed due to a landslip at Loch Eilt in January 2018

RAIB's ongoing investigation will consider the design and construction of the failed drain. It will also look at the response to severe weather events, decision-making at times of widespread disruption and the mitigation of derailments at such high-risk locations.

Drainage deficiencies

The lack of an asset database record for a drain installed less than ten years ago underscores the conclusion in Lord Mair's report that drainage is generally regarded by Network Rail as a 'child' asset which supports the performance of earthworks

and track. As a result, Network Rail has a dated drainage system about which it has little knowledge.

Although his report commends Network Rail for its substantial effort in developing a comprehensive earthworks asset management system, it notes that the Earthworks Technical Strategy does not consider drainage or vegetation management in a meaningful way and that, hence, there are key omissions in the earthworks policy, for example drainage competence.

It notes that earthworks stability is dependent on drainage systems that were installed to default designs that took no account of run-off and water flow. Furthermore, there has been little enhancement of drainage, with replacement over the years being like-for-like.

Rail Engineer's 2011 feature on the Carmont cutting works shows there was an awareness of the increased run-off from the fields above. Yet the way this run-off overwhelmed the failed drain highlights the importance of drainage having sufficient hydraulic capacity.

The report calls for drainage maintenance and cleaning to be undertaken by dedicated teams with sufficient competent staff, as is the case for earthworks examinations. It considers drainage maintenance to be under-resourced as the off-track teams who do it are often overloaded with drainage inspections or diverted away to respond to incidents.

A retention wall built for double-tracking between Aberdeen and Inverurie.

Reviewing earthworks management

Drainage was just one aspect of Lord Mair's 543-page report which also considered earthworks vulnerability, as well as earthworks, drainage and vegetation asset management, and monitoring technologies. It reviewed the historic nature of earthworks assets and provided an academic treatise of their soil mechanics and failure mechanisms. In considering changing weather patterns, the report noted the very strong correlation between earthworks failures and rainfall over the past two decades.

Lord Mair concluded that the dominant reason for continuing failures is the exposure of over-steep and previously failed slopes to rainfall patterns not previously experienced. His report expressed reservations about Network Rail's use of soil moisture index to monitor earthworks instead of the more important parameter of pore water pressure.

The threats from climate change were considered to be:

- longer periods of prolonged rainfall in winter months leading to rising groundwater levels and higher slope pore pressures
- more frequent periods of more intense rainfall triggering washouts and debris flows
- hotter, drier summers increasing the amplitude of cyclic slope pore pressure changes, particularly clay embankments
- increased demand on drainage capacity and the risk of it being overwhelmed.

The report considered that "predicting exactly where failures will occur is like looking for a needle in a haystack" and noted that a more practical approach is to "search for the haystacks", i.e. vulnerable lengths of slope. It noted that a localised failure strongly indicates that the remainder of the similar slope is vulnerable to future failures.

It also considered how vegetation can have both a beneficial effect – reducing surface erosion, providing root reinforcement, avoiding channelling of flows, maintaining surface pore water suctions – and a detrimental one with blocked ditches and pipes, leaf fall, tree fall and desiccation by the track. Although Network Rail has done work to improve vegetation management, the report considers a more integrated approach to the management of earthworks, drainage and vegetation is needed.

Asset management

The report commends Network Rail for its substantial work in developing a comprehensive earthworks asset management system. It notes that, unlike track or rolling stock assets, earthworks are inherently variable and that this is further affected by uncertain environmental conditions. Furthermore, the earthworks failures trend has significantly worsened since the start of CP6. The 251 failures in the first year of this control period is about double the number in each of the previous three five-year control periods.

Recommended changes in examination regime include extending the season to include April and undertaking examinations during or shortly after heavy rainfall. The use of drones and helicopters is recommended both for this and identifying any changes that could adversely affect earthwork stability between routine examinations.

The report considers the effectiveness of the Earthworks Hazard Category (EHC). It notes that 59% of the 2019/20 earthwork failures were classified in lowest risk 'A to C' pre-failure categories. Furthermore, around two-thirds of the failures in the early part of CP6 were at sites where no work was planned during the control period. This suggests that many vulnerable earthworks are not included in the investment plan. Hence, it recommends a review of the EHC process.

Cutting work needed to reinstate double track for the Borders Railway near Stow.

The difficulty faced by Network Rail's geotechnical engineers in making effective asset management decisions on the basis of multiple and disparate data sources is also considered by the report which concluded that an improved earthworks asset management system that uses data from intelligent infrastructure is needed.

Monitoring to mitigate

As it is currently not possible to detect or prevent all earthwork failures, the report considers their mitigation. This needs reliable monitoring to inform Network Rail's engineers of the condition of the more critical geotechnical assets.

There are two objectives for such monitoring: detection of failures affecting the safety of the line and collecting data to predict possible failures.

Techniques used or trialled by Network Rail for rapid and instantaneous detection of failures include distributed acoustic sensing by optical fibres surface-mounted tiltmeters and inclinometers and instrumented flexible barriers for rock and soil slopes.

Those with a slow failure response that are suitable for the collection of condition data include:

- distributed acoustic sensing by optical fibres
- the promising application of wireless tiltmeter systems
- satellite InSAR (Interferometric Synthetic Aperture Radar) which compares radar images over time to detect ground deformation to millimetre accuracy
- aerial and land-based LiDAR and photogrammetry which international experience indicates to be promising surveillance technologies for slope and landslide management, and the need for train-mounted LiDAR systems to update the geometry and features of cutting slopes
- Electrical Resistivity Tomography (ERT)
- Shape Acceleration Arrays (SAA)
- the continuation of acoustic sensing as part of Network Rail's R&D programme in view of its potential to detect instability of soil and rock slopes.

More widespread use of helicopter flights to inspect earthworks was considered necessary, especially in hilly or mountainous terrain and after an extreme weather event. In Scotland, five such flights are made each year, specifically for earthworks inspections.

The identification of potential embankment failure sites by Network Rail's track geometry data collection and analysis workstream was commended, as was the company's Intelligent Infrastructure programmes and impressive R&D portfolio of novel earthworks monitoring technologies.

Forecasting chaotic weather

Dame Julia Slingo's report considered how Network Rail could obtain the best possible weather forecasts and make best use of them.

It looked at the latest advances in weather forecasting to show what could be made available to Network Rail and described how forecasts start with a global atmospheric assessment requiring 100 million observations to be processed. Global forecasts are needed as the UK's weather often has its roots from the other side of the globe. They provide the boundary conditions for finer-scale UK regional forecasts that are then undertaken.

This process takes two hours and is repeated every six hours. It requires 20 quadrillion calculations and generates 10,000GB of data. Such forecasting is one of the most complex computing applications, involving over a million lines of code and the use of dedicated supercomputers.

Due to the chaotic nature of climate systems, current practice is to produce an ensemble of forecasts to assess the probabilities of a range of outcomes. These are continually reviewed to provide increasingly narrower spread closer to the time of the forecast.

Kilometre-scale forecasting 1-3 days in advance is now possible due to the recent development of models that accurately represent the landscape and a better understanding of the physics of thunderstorms and convection. Nowcasting is a technique that forecasts the next 1-2 hours using optical flow techniques that extrapolate weather radar images to detect the severe convective storms of the type seen at Carmont.

At the time of the derailment, Network Rail's weather advice used a 10km weather model that could not capture local extremes. However, since then there has been a rapid development of the company's weather services.

Harnessing forecasts

Using weather data to best manage the risks to the operational railway requires an understanding of how rainfall translates into geohazards and the use of forecasts to take timely operational decisions.

The rail network is particularly susceptible to hazards such as surface flooding, washouts and earthwork slides. The weather report notes that Carmont showed how hourly rainfall intensity may be a critical factor driving earthworks failures.

Before the derailment, Network Rail used Extreme Weather Action Teleconferences to advise routes of forthcoming adverse weather. This was considered to be a static process, with limited capability to adjust alerts in an evolving weather situation.

Action to be taken was in accordance with thresholds which, according to the report, needed a major overhaul to reflect variations in exposure across the network, particularly in respect of rainfall. It noted that, after Carmont, the company acted swiftly to improve preparedness for extreme weather events and their impact on earthworks, with the development of a Convective Alert Tool.

Dame Slingo's report recommends use of the following weather management framework:

- Awareness – possible regional red weather alerts are recognised 4-5 days out
- Preparation – route controls assign red weather alerts two days out using of kilometre-scale forecasts and begins to take preparatory action
- Response – monitoring and alerting by nowcasting during extreme weather events
- Recovery – establish priorities and provide weather forecasts for recovery.

Implementing this framework requires both competent personnel and effective systems that clearly present relevant data to support effective decision making. The weather task force found that there was a gulf in expertise between those creating weather information and those receiving it. Hence it considered that Network Rail should have a 'weather academy' to ensure its staff are well-informed users of weather services. This includes scale and predictability awareness. For

example, a 10km scale thunderstorm has an average predictability limit of around three hours whilst a 100km frontal rain system can be forecast two days ahead.

The weather task force concluded that a suitable digital platform to present relevant weather data is needed and that this should use Network Rail's Geographic Information System to provide this data on the network map to best aid effective decision making.

Such a prototype system, together with Met Office data, was used in a 'Sandpit' trial in December. This correctly predicted localised events and generated positive feedback from those involved. One Route Operations Manager, who was particularly impressed by the detail and granularity provided, was confident that such systems would enable mitigation measures to be applied in the right place and also could see the end of miles of unnecessary blanket speed restrictions.

Reducing the risk

Modern standards require a significant amount of earthwork retention when double-tracking a single line or reopening a previously closed railway. However, as noted in Network Rail's interim report following the Carmont derailment, rebuilding thousands of miles of earthworks to such standards is not practicable in the short-term, either from a funding or delivery perspective.

Prior to Carmont, the last fatality from an earthworks failure was in 1995. Yet, with various earthworks derailments since then, there was a recognition that this was a significant area of risk. Hence £1.3 billion is to be invested in earthworks and drainage in CP6, nearly double that of CP4. Furthermore, Network Rail had improved its earthworks management for which it was commended in the task force reports. Yet Carmont showed that more needed to be done.

The depth and detail of the reports led by Lord Mair and Dame Slingo reflect the expertise of their members and offer many best-practice solutions. Whilst it is not reasonably practicable to detect or prevent all earthworks failures, the recommendations should significantly reduce the risks involved.

(7th June 2021, https://www.railengineer.co.uk/learning-from-carmont/)

ΝΕΑ ΑΠΟ ΤΙΣ ΕΛΛΗΝΙΚΕΣ ΚΑΙ ΔΙΕΘΝΕΙΣ ΓΕΩΤΕΧΝΙΚΕΣ ΕΝΩΣΕΙΣ

International Society for Soil Mechanics and Geotechnical Engineering

ISSMGE News & Information Circular June 2021
www.issmge.org/news/news-and-information-circular-june-2021

1. ELECTION OF ISSMGE PRESIDENT 2022-2026

As a consequence of the 20ICSMGE being pushed back to May 2022, and in accordance with the Statutes and Bylaws, the deadline for receiving nominations for the next ISSMGE President has been extended to 30th January 2022.

2. ISSMGE REGIONAL VICE-PRESIDENTS 2022-2026

The ISSMGE is pleased to announce the names of the regional vice-presidents for the next term (2022 - 2026). They are:

Africa: Dr Marawan Shahin (Egypt)
Asia: Professor Keh-Jian Shou (Chinese Taipei)
Australasia: Mr Graham Scholey (Australia)
Europe: Professor Lyesse Laloui (Switzerland)
North America: Mr Walter Paniagua (Mexico)
South America: Professor André Pacheco de Assis (Brazil)

3. 20ICSMGE / 7iYGEC NEW DATES MAY 2022

New dates have been confirmed for the conferences in Sydney as follows;

7iYGEC - Friday 29 April-Sunday 1 May 2022
20ICSMGE Sunday 1 May Thursday 5 May 2022.

For more information, please visit the conference website (https://icsmge2021.org/)

4. NEW WEBINAR

Experiences in Sustainable Geotechnics, delivered by Prof. Nilo Consoli, is a new webinar now available from the ISSMGE website.

5. 3rd HUTCHINSON LECTURE - 3rd JTC WORKSHOP NORWAY, 2022 CALL FOR PROPOSALS

The Joint Technical Committee (JTC1) on Natural Slopes and Landslides of the Federation of the International Geo-engineering Societies (FedIGS) is organizing the 3rd JTC1 workshop, which will be held in Norway in Spring, 2022; the provisional title of the event is Landslide initiation, prediction and risk mitigation.

The workshop will host the 3rd Hutchinson Lecture, which has been established by the same JTC1 to award a scholar, aged 42 or less at the time of the event, who has significantly contributed to the development of knowledge in the field of slope stability and landslides. The Hutchinson Lecture should deal with a subject consistent with the workshop issues. The lecture will be published in an international journal.

The Hutchinson lecturer, who should have a disciplinary background from one or more of the domains of the geosciences, will be chosen - by vote of JTC1 Committee members - among candidates proposed by national societies. All countries are then asked to propose their own candidate. The proposals, accompanied by the candidate CV, should be submitted to the JTC1 chairman, Luciano Picarelli, by September 15th 2021 (luciano.picarelli@unicampania.it) .

6. BULLETIN

The latest edition of the ISSMGE Bulletin (Volume 15, Issue 2, April 2021) is available from the website https://www.issmge.org/publications/issmge-bulletin/vol-15-issue-2-april-2021

7. ISSMGE FOUNDATION

The next deadline for receipt of applications for awards from the ISSMGE Foundation is the 30th September 2021. Click here for further information on the ISSMGE Foundation.

8. 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 since the previous Circular:

ISSMGE Events

4TH INTERNATIONAL SYMPOSIUM ON FRONTIERS IN OFFSHORE GEOTECHNICS - 28-08-2022 - 31-08-2022 University of Texas, Austin, United States; Language: English; Organiser: ISFOG 2020 Organising Committee; Contact person: PHIL WATSON, Address: The University of Western Australia, Phone: 0418881280, Email: phillip.watson@uwa.edu.au; Website: http://www.isfog2020.org

11TH INTERNATIONAL SYMPOSIUM ON FIELD MONITORING IN GEOMECHANICS, 04-09-2022 - 08-09-2022 Imperial College London, United Kingdom; Organizer: TC220, Contact person: Dr Andrew Ridley; Email: andrew.ridley@geo-observations.com

17TH ASIAN REGIONAL GEOTECHNICAL ENGINEERING CONFERENCE - 14-08-2023 - 18-08-2023 Nur-Sultan, Kazakhstan, Kazakhstan ; Language: English; Organiser: Kazakhstan Geotechnical Society; Contact person: Ms. Bibigul Abdrakhmanova; Address: 2, Satpayev Street, Eurasian National University, Geotechnical Institute; Phone: +7-7172-34479; Fax: +7-7172-353740; Email: bibakgs@gmail.com; milanbi@mail.ru

NON-ISSMGE Events

12TH INTERNATIONAL CONFERENCE ON GEOSYNTHETICS, 17-09-2023 - 21-09-2023 Auditorium Parco della Musica, Rome, Italy. Language: English; Organiser: Associazione Geotecnica Italiana - Italian Chapter of IGS; Contact person: Susanna Antonielli, Address: AGI-Viale dell'Università 11, Phone: +39 06 4465569; Fax: +39 06 44361035; Email: info@12icg-roma.org; Website: http://www.12icg-roma.org;

TC 307 - ISSMGE Sustainability Committee - Status Report 3

Dear TC307,

Greetings! I welcome you to Status Report 3 from TC 307 (June 1, 2021).

1. VU Talks - Please note we already posted our first TC307 talk on the web (https://www.issmge.org/education/recorded-webinars/experiences-in-sustainable-geotechnics). We thank Prof Consoli for contributing his talk to the TC307.

2. ISSMGE 2022 Conference Updates:

With the April outbreak of COVID in some countries and uncertainty of border restriction, it is most likely the Syndey ICSMGE 2022 conference: *A geotechnical discovery down under* will be a hybrid conference. Technical papers are due by June 1, 2021. The paper shall be NO LONGER THAN 6 pages and should be submitted in PDF and Word format. Papers will subsequently be reviewed by the relevant Member Societies, and final, updated documents are due by July 30, 2021. Technical Program Committee and the Advisory Committee of Sydney ICSMGE2022 have given the freedom to TC 307 to prepare and present a general technical report in our TC-parallel session. We are waiting for the confirmation of the two proposed parallel session.

3. ISSMGE - Time Capsule Survey an update from Dr Olivier Cuisiner

"Recently we invited you to participate in a short survey. As you may know, Technical Committees of the ISSMGE has been asked to succinctly document the development of their area, most conveniently by decades, focussing on major breakthroughs and why that came about, with collateral material (papers etc.) that support their story. As TC307 members, we kindly ask you to complete this survey and to provide sufficient details/references. Your contributions will be used to prepare the TC307 contributions to the ISSMGE time capsule. This survey is for the TC307 officers only. So far, we have received only four complete answers. We note that many of you have not yet completed the survey. therefore, we have modified the deadline, and the survey is now opened until June 14, 2021.

The survey is titled: "TC307 - Time capsule survey"

We strongly encourage all members to submit their responses by June 14, 2021. Thanks in advance!

4. Conferences - CREST 2020 - very well attended and an excellent conference organized by Prof Hemant Hazarika of Kyushu University. We congratulate him on the successful conference.

5. TC307 Webinars - We plan to organize them in the second half of 2021. Please send your interests directly to us (Mizan, Olivier and Anand). Thanks

Any posts or conference announcements related to TC307 - please send them to us, and do not directly post them. If they are relevant to our committee works, we will post or include them in our next status report.

Are we witnessing the emergence of the Third Era in Geotechnical Engineering Practice?

Traces of geotechnical engineering practice is abundant in history and dates back to at least 2000 BC. The Worlds rich heritage reflects the undertakings of skilled civilizations who expanded their cities infrastructure and erected monuments with no formal science and design procedure in hand. This experience-based practice remained for centuries. One can describe this long period as an **Experimental Era** that had its own successes and unfortunate failures.

In the 18th century, when science started evolving, geotechnical engineering practitioners adopted a scientific-based approach to study soil behavior. Modern day geotechnical engineering practice began in the past century with the publication of *Erdbaumechanik* by Karl Terzaghi. The second half of the century brought forward the use of codes and standards. This **Scientific Era** allowed the identification and control of geotechnical failures.

Codes and standards have been adopted in engineering as they document recommended practices and procedures to ensure stability and safety. Although codes generally have legal bearing, adherence to them is not always mandatory in design and construction. Yet, engineers not adhering to the codes will face liability charges if the structure fails. Public and Private Authorities have recently began establishing their own *regulations* relevant to the geotechnical engineering practice. We are currently witnessing an **Era of Regulation** with gradual implementation of *protocols* and *rules* on how to perform geotechnical investigations, which design method(s) to apply, and how to proceed during construction.

The emergence of regulations in geotechnical engineering practice is surely not equal across countries and engineering companies. We can generally distinguish between three categories:

- **Regulation with Permit**: where public/private authorities impose, via their regulations and specifications, defined procedures to be applied in geotechnical engineering practice **and** further impose pre-approval via a Permit procedure.

- **Regulation without Permit**: where public/private authorities impose, via their regulations and specifications, defined procedures but **do not** impose any Permit. It is worth noting, that in some markets, Clients tend to engage third party reviewers to ensure proper implementation of these regulations.

- **No Regulation - No Permit**: where geotechnical engineers simply apply their best practice procedures and deliberately follow a professional standard of care and ethics without being exposed to any Permit procedure.

As this third Era of geotechnical engineering practice is emerging, the imposed regulation will lead to an evolution in the practice. Share with us your experience in the countries where you practice geotechnical engineering by clicking on this link.

About the authors:

Roger Estephan is Director of the Geotechnical and Heavy Civil Engineering Department at Dar. He follows up on the

geotechnical aspects of Dars projects in more than 40 countries (Middle East, Gulf, Africa and India). Roger is member of ISSMGEs CAPG & IDC.

Grace Abou-Jaoude Estephan is Associate Professor in Civil Engineering at the Lebanese American University (LAU). She has a combined geotechnical experience is the industry and academic fields. Grace led geotechnical research projects funded by international agencies including NAS/USAID PEER programs.

Outside the geotechnical field, Roger and Grace are the parents of 4 kids.

About these articles:

To debate past, current and future issues in Geotechnical Engineering, the Time Capsule Project is welcoming and publishing short articles on the ISSMGE website.

We challenge you to write 200-400 words on any topic that will generate debate within the Geotechnical Engineering profession. Click here to submit your message for consideration.

Articles will be displayed for a limited time and views expressed need not be shared by the ISSMGE or held strongly by authors.

Announcing the Publication of the 2021 Geotechnical Business Directory

Geoworld, the network for geotechnical engineers, has just published the 2021 Geotechnical Business Directory. The directory is published with the support of the International Society for Soil Mechanics and Geotechnical Engineering. This is **the seventh 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 2021 index has grown significantly since last year and includes **23,000+ members**, and **1,000+ geo-companies** and **geo-organizations** from a total of **157 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 2022 Business Directory that is expected to include 24,500+ 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 2022 Geotechnical Business Directory.

Webinar: Teaching unsaturated soil mechanics at the undergraduate level

The webinar will focus on undergraduate unsaturated soil mechanics teaching, with world-class specialists sharing their views and experiences.

Organizer: Pan-American Conference on Unsaturated Soils ABMS - Unsaturated Soils Committee

When: Friday July 16, 2021, 18:00-20:00 (Brasilia-Sao Paulo time, UTC/GMT -3)

Where: https://www.youtube.com/channel/UC4a9ZahknWPNSoGb0ZIIpsw
(link valid for both for live event and recorded webinar)

Program

- Undergraduate unsaturated soil mechanics for the 2020s. Delwyn G. Fredlund (University of Saskatchewan, Canada)
- Centrifuge modelling of unsaturated soils, what is known, and what is missing. Bernardo Caicedo (Los Andes University, Colombia)
- Building an understanding of the impacts of transient flow processes on the mechanical behavior of unsaturated soils. John S. McCartney (University of California San Diego, USA)
- Roundtable Discussions, with the participation of D. Fredlund, B. Caicedo, J. McCartney, K. Bicalho, G. Gitirana.

Mediterranean Symposium on Landslides

Foreword

http://www.iaeg.info/event/1st-mediterranean-symposium-on-landslides/

https://www.youtube.com/watch?v=T73YJ720yKw&list=PL5nQSeysa4qMTAegC3DXSVheZsWb778Bp

E-meeting Serviceability Limit States Analyses of RSS

TC218 proposed to start an E-mail exchange on Serviceability Limit States Analyses of Reinforced Soil Walls.

The E-meeting started on Monday 8 July 2019 and ended on Sunday 21 July 2019. Approximately 20 Experts from 5 Continents participated to the discussion.

To download the file, please click on the link below:

https://www.mygeoworld.com/file/139830/e-meeting-serviceability-limit-states-analyses-of-rss-july-2019

Any questions feel free to contact:

Shahriar Mirmirani - smirmirani@recocanada.com - TC218 Secretary

Giulia Lugli - g.lugli@maccaferri.com - TC218 Chairman

A special issue "Emerging Trends in Discrete-based Modeling and Characterization of Geotechnics"

A special issue "Emerging Trends in Discrete-based Modeling and Characterization of Geotechnics" which was edited by TC105 members, Catherine O'Sullivan (Imperial College) and Jidong Zhao (Hong Kong University of Science and Technology), is available from this Computers and Geotechnics website.

https://www.sciencedirect.com/journal/computers-and-geotechnics/special-issue/10CJCNXXL1G

The special issue is a collection of papers extended from some works presented at the 8th International Conference on Discrete Element Methods, which took place at the University of Twente, Netherlands, in 21st-26th July 2019.

Rocscience Webinar - Webinar: From Modelling to Real Case Studies using Settle3

This free webinar brought to you by Rocscience in association with Terracon, will showcase the latest features and applications of our 3D Settlement Analysis software Settle3, as well as cover a real case study that was conducted using the program.

link for the registration:

https://www.rocscience.com/about/news-events/from-modelling-to-real-case-studies-using-settle3

Data/Time:

Wednesday, July 21st, 2021, at 1 PM Eastern Daylight Time (7 PM Central European Summer Time)

New Rankine Lecture date confirmed

The British Geotechnical Association (BGA) plans to hold the postponed 60th Rankine Lecture on 20 October 2021.

Last year, due to the conditions of the Covid-19 pandemic, the BGA had to postpone the 60th Rankine Lecture.

The rescheduled lecture was due to be held on 17 March 2021. However, it was pushed back further due to prevailing Covid-19 restrictions and in light of the continuing health risks of hosting large events.

The BGA is hopeful that conditions will improve this year. Therefore, the BGA plans to hold the 60th Rankine Lecture at Imperial College London on 20 October 2021.

If it is possible to host large events at this time, the Rankine Dinner will follow the lecture as usual.

The lecture is to be given by Stephan Jefferis of Environmental Geotechnics on the topic of "The Unusual and the Unexpected in Geotechnical Engineering: Observation – Analogy – Experiment".

The event will also be webcast live.

It is currently planned to hold the 61st Rankine Lecture in March 2022. The name of the 61st Rankine Lecturer will be announced after Jefferis' lecture.

More information can be found on the BGA website.

ISRM International Society for Rock Mechanics and Rock Engineering

News
https://www.isrm.net/noticias/?tipo=1&todas=1

New ISRM course on Monitoring Data Interpretation by Prof. Wulf Schubert

This course was recorded in 2021 by Prof. Wulf Schubert, an ISRM Fellow and Vice President at Large for the ISRM from 1999 to 2003.The course has six parts:

- Part 1 - Geotechnical Monitoring for Tunnels
- Part 2 - Prediction on Displacements and Check of System Behavior with GeoFit
- Part 3 - Use and Importance of Deflection or State Lines

- Part 4 - Displacement Vectors in Cross and Longitudinal Section
- Part 5 - Evaluation of Displacement Vector Orientations and Ratios of Displacement Components
- Part 6 - Evaluation and Prediction of Lining Utilization from Displacement Measurements

New ISRM course on Rock Mass Characterization and Monitoring based on Advanced Remote Sensing Techniques

This course was coordinated in 2021 by Prof. Leandro Alejano, from University of Vigo, Spain and ISRM Vice President for Europe. The course has an introduction and four parts.

- Part 0 - Leandro Alejano - Course Presentation
- Part 1 - A.M. Ferrero & M. R.Migliazza - Introduction of advanced survey methods for rock mass characterization and monitoring
- Part 2 - Gessica Umili - Methods for automatic or semi-automatic discontinuity traces sampling on digital rock mass
- Part 3 - Adrían Riquelme - Rock Mass Characterization and Monitoring based on Advanced Remote Sensing Techniques
- Part 4 - Roberto Tomas - SAR Interferometry in Rock Mechanics

The ISRM courses are available to everybody during the coronavirus pandemic at **https://www.isrm.net/gca/?id=912** .

ISRM Suggested Method video on the website

Based on the cooperation between Prof. Seokwon Jeon from Seoul National University (South Korea) and the ISRM Commissions on Testing Methods and on Education, video films on the ISRM Suggested Methods, which are made for educational purposes, will be embedded on the website of the Commission on Testing Methods.

This initiative is an attempt to provide detailed explanations on the ISRM Suggested Methods. The video films are being recorded from the experiments conducted in the Rock Mechanics and Rock Engineering Laboratory of the Seoul National University. The first video films, listed below, are on Basic Rock Sample Preparation, Uniaxial Compressive Strength and Deformability and Point Load Strength. New video films on other Suggested Methods will also appear on the website in near future.

Click on the title bellow to open the video:

- Suggested Methods for Determining Direct Tensile Strength of Rock Materials (Part 1: Suggested Method for Determining Tensile Strength) (2021)
- Strength of Rock Materials in Triaxial Compression (2020)
- Basic Friction Angle of Planar Rock Surfaces by Means of Tilt Tests (2019)
- Shear Strength of Rock Joints (2018)
- Water Content, Porosity, Density, and Wave Velocity (2018)
- Brazilian Tension Test (2018)
- Uniaxial Compressive Strength and Deformability of Rock Material (2018 revised version)
- Point Load Strength (2016)
- Basic Rock Sample Preparation (2016)

34th ISRM online lecture by Prof. Doug Stead

Dear ISRM Members and Rock Mechanics Colleagues,

For the 34th ISRM Online Lecture the ISRM invited Professor Doug Stead, from Simon Fraser University, B.C, Canada. The title of the lecture is "Rock Slope Engineering: A Combined Remote Sensing-Numerical Modelling Approach". It will be broadcast on 24th June 2021 at 10 AM GMT at www.isrm.net.

Dr. Stead began his career in geotechnical engineering in 1978 working on rock and soil slope stability at Nchanga Open Pit in the Zambian Copperbelt, Africa. This was immediately followed by periods working in engineering geology and rock mechanics consulting in the UK and Hong Kong. In 1984, after obtaining his PhD at the University of Nottingham, investigating rock slope stability in UK surface coal mining he was appointed Lecturer in Applied Geology at the University of Papua New Guinea and then in 1986 Assistant Professor in Geological Engineering at the University of Saskatchewan, Canada. From 1996-2000 he was Chair in Geotechnical Engineering Camborne School of Mines, University of Exeter, UK. In 2000, he returned to Canada where he was Chair in Resource Geotechnics until June 2021. His research has focussed on experimental rock mechanics (brittle fracture and acoustic emission), open pit and underground geomechanics and rock slope engineering, Current rese arch emphasises the applications of numerical modelling, remote sensing, and most recently mixed-virtual reality visualisation in rock engineering.

Dr. Stead has received several awards for his contributions to geotechnical engineering from the Canadian Geotechnical Society, CGS, including the societies most prestigious award the RH Legget Medal (2017), the John Franklin Award for contributions to Canadian rock mechanics (2009) and the Thomas Roy Award for engineering geology, (2008). He was also awarded the Engineering Institute of Canada, John B. Stirling Medal (2019) for his leadership and services to geotechnical engineering.

Dr. Stead has authored over 300 technical papers on engineering geology and rock engineering. He has delivered numerous keynote presentations and has been selected as the Fall 2021 CGS Cross Canada Lecturer. He was co-author with Dr. Loren Lorig of the chapter on numerical modelling in the textbook "Rock Slope Engineering, 2017 5th edition" by Dr Duncan Wyllie and was co-editor with Dr. John Clague of the book "Landslides: Types, mechanisms and modelling".

Dr. Stead served as both ISRM Vice-President for North America and Chair of the ISRM Technical Commissions Oversight Committee (2015-19), He is Past Vice-President Technical for the Canadian Geotechnical Society and Past President of the Canadian Geoscience Council. Dr. Stead is a Fellow of the Engineering Institute of Canada, an Honorary Visiting Professor at the University of Exeter, UK and Affiliate Professor at the University of British Columbia, Canada. Dr. Stead has undertaken extensive research/consultancy on a wide range of projects in Europe, North America, Africa, Asia, and Australia.

The lecture will remain online so that those unable to attend at this time will be able to do it later. As usual, the attendees will be able to ask questions to the lecturer by e-mail during the subsequent five days. All online lectures are available from **this page**.

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

Scooped by ITA-AITES #45, June 2021

Irish Sea Link | Proposal for bridge and tunnel crossing via two man-made islands | Ireland - UK

Green light for New York's £8bn Hudson tunnels project | United States of America

Futuristic underground cargo project moves a step closer to reality | Switzerland

Boring Co.'s Las Vegas tunnel opens to public | United States of America

Banihal-Qazigund tunnel likely to be operational in coming weeks | India

Reliable, experienced contractor to build 38-km water tunnel in the mountains of Lesotho

ECRL Dungun tunnel breaks through six months ahead of schedule | Malaysia

Last tunnel of China-Laos railway drilled; all 67 communication towers also completed

Crushed glass could replace sand in shotcrete

Big bore: Giant tunnelling machine starts work on HS2 | UK

Kaliwa dam excavation to start in December | The Philippines

Tunnel contract worth $757.1M awarded for Scarborough subway extension | Canada

Scooped by ITA-AITES #46, 22 June 2021

Thailand's longest dual-track tunnel excavated

All undersea road tunnels in Faroe fitted with advanced lighting - a well as light art installations | Faroe Islands

Vancouver tunnel aimed at easing SkyTrain construction chaos | Canada

Bangabandhu tunnel construction going on in full swing | Bangladesh

Micro Tunnel Boring Machine begins tunnelling and inserts first pipe for groundbreaking Central Interceptor project | New Zealand

Interest sought for Norway's longest subsea tunnel and suspension bridge

The big dig: After 15 years of planning, wastewater tunneling begins beneath South Bay, Harbor Area | United States of America

UK Government confirms 'high level discussions' about Holyhead to Dublin underwater tunnel

Hunt starts for A303 Stonehenge technical consultant | UK

Pawtucket tunnel to catch dirty water before it hits Narragansett Bay | United States of America

Amtrak, Maryland DOT Debut B&P Tunnel Replacement Plan | United States of America

ice Publishing

Happy International Women in Engineering Day 2021

On 23 June we celebrate women in engineering and related professions. This year's theme — Engineering Heroes — focuses on the amazing contribution women make to the civil engineering industry.

Geo-Institute of ASCE

Peck Celebration Playlist

On this day, June 23, 1912, Ralph Brazelton Peck was born in Winnipeg, Manitoba. In his 95 years, he became a giant in the field of geotechnical engineering. He spent the majority of his teaching career at the University of Illinois at Urbana Champaign, and continued to work as a consulting engineer until well into his 90s. The many awards bestowed upon Professor Peck included the ASCE Norman Medal (1945), the ASCE Terzaghi Lecture (1963), the ASCE Wellington Prize (1966), the ASCE Karl Terzaghi Award (1969), and the United States National Medal of Science (1976).

Over his 95 years, he became one of the most eminent geotechnical engineers in the world. Today, the Peck Lecture is given annually celebrating his legacy. Check out our playlist of Professor Peck himself and several recent Peck Lectures! https://lnkd.in/dk8bEQa

The Coming of Age of Soil Mechanics: 1920-1970 - 1993 Buchanan Lecture by Ralph B. Peck Geo-Institute of ASCE

Ralph Peck - Engineering Judgement (Full Video) Blake Holowick

Ralph B. Peck, 1912 - 2008 mstvcc

IFCEE 2021: G-I RALPH B. PECK MEDAL LECTURE Geo-Institute of ASCE

2020 Ralph B. Peck Lecture: Problematic Soils Geo-Institute of ASCE

2019 Ralph B. Peck Lecture: Observations and Findings from Christchurch Geo-Institute of ASCE

2018 Ralph B. Peck Lecture: Field Performance Data and Support of Excavation Design Geo-Institute of ASCE

2017 Ralph B. Peck Lecture: A New Paradigm for Slope Stability Analysis Geo-Institute of ASCE

2016 Peck Lecture - Liquefaction and Spatial Variability Geo-Institute of ASCE

2015 Peck Lecture - Bio-Stabilization of Slopes and Stream Banks Geo-Institute of ASCE

2015 Terzaghi Lecture - The Evolution of Specialty Geotechnical Construction Techniques Geo-Institute of ASCE

2014 Peck Lecture:Innovations in Modeling & Monitoring Tech. for Response of Deep Urban Excavations Geo-Institute of ASCE

2013 Peck Lecture - "Liquefaction Effects on Structures" Geo-Institute of ASCE

2012 Ralph B. Peck Lecture: Bentonite Barriers for Geoenvironmental Containment Geo-Institute of ASCE

2011 Ralph B. Peck Lecture: Seismic Design of Underground Structures Geo-Institute of ASCE

International Commission on Large Dams

ICOLD 27th Congress - 90th Annual Meeting
https://cigb-icold2022.fr/en/

NEW DATES: From 27 May to 3 June 2022

The ICOLD Board has decided to further **postpone the NEXT 2021 ICOLD Congress** until **May 27th - June 3rd, 2022** in **Marseille**, France.

Originally scheduled for June 2021, the MARSEILLE CONGRESS had already been postponed to November 2021 due to COVID 19. The current situation of the pandemic and the uncertainties about the possibilities of participation in the Congress by our member countries still does not allow us to consider holding it in 2021. Indeed, a recent survey conducted by the French National Committee (CFBR) found that most countries could not commit to an in-person conference in 2021.

The ICOLD Congress is a legacy and marquee event for our organization with an important focus and in-depth evaluation of current state-of-the-practice technical "Questions" on dams and levee infrastructure. There is also encouragement to know that **we are setting the conditions for the most successful Congress in 2022** with the best opportunity for our entire ICOLD family to safely participate in person.

ICOLD will organize a **Virtual Conference** on **November 15th - 19th, 2021** (same week as initially foreseen for the Marseille Congress) mainly including a **Tech. Cttees Chairs Meeting,** a **CFBR Symposium**, **Tech. Cttees Workshops**

and a General Assembly (detailed information and program will be sent later)

This one-year postponement is also applied to all other ICOLD events. We thank all organizing committees for their patience and cooperation. This is the new agenda:

- **2022 MARSEILLE (France)** CONGRESS
- **2023 GOTHENBURG (Sweden)** ANNUAL MEETING
- **2024 NEW DELHI (India)** ANNUAL MEETING
- **2025 CHENGDU (China)** CONGRESS
- **2026 SHIRAZ (Iran)** ANNUAL MEETING

EWG Dams and Earthquakes - Report on the 2016 Mw6.3 Meinong Earthquake, Taiwan

Please find an interesting report on the geotechnical reconnaissance of the 2016 Mw6.3 Meinong Earthquake, Taiwan.

Taiwan M 6.3 earthquake Geotechnical Reconnaiss...

Regards.

Guillaume VEYLON
guillaume.veylon@inrae.fr

International Association for Engineering Geology and the Environment

IAEG Connector E-News

Entire MLS 2021 (Mediterranean Landslide Symposium) video recording on IAEG website

Professor Giorgio Lolino reminded us that the complete video recording of this recent conference can be found on our IAEG website, which can be found at https://www.iaeg.info.

READ MORE

IAEG Electronic Newsletter 2021 Issue No.1

We are pleased to share the 2021 Newsletter Issue No.1 with you. Please click here to view the new issue of the newsletter.

READ MORE

ΔΙΑΚΡΙΣΕΙΣ ΕΛΛΗΝΩΝ ΓΕΩΤΕΧΝΙΚΩΝ ΜΗΧΑΝΙΚΩΝ

Congratulations to Dr. Evangelia Korre for being awarded the Thomas Archibald Bedford Prize (1964), in acknowledgement of her PhD research


RENSSELAER
POLYTECHNIC INSTITUTE
honors
Evangelia Korre
as a recipient of the
Thomas Archibald Bedford Prize
Rensselaer salutes your outstanding achievements.

Congratulations to Dr. Evangelia Korre for being awarded the Thomas Archibald Bedford Prize (1964), in acknowledgement of her PhD research at the Rensselaer Polytechnic Institute on assessment of liquefaction hazards for sloping ground and retaining sheet-pile quay walls. Established by Clay P. Bedford in memory of his father, the prize is awarded at Commencement to a graduate student in civil engineering who has demonstrated high scholastic ability and has made a substantial contribution to the field. The selection is made by the provost upon recommendations from the Office of Graduate Education. (http://catalog.rpi.edu/content.php?catoid=4&navoid=83)

https://geotechnics.ethz.ch/news---events-2/news.html#korreaward

ΠΡΟΣΦΟΡΕΣ - ΠΡΟΚΗΡΥΞΕΙΣ ΘΕΣΕΩΝ ΓΙΑ ΓΕΩΤΕΧΝΙΚΟΥΣ ΜΗΧΑΝΙΚΟΥΣ

**ETH Zurich emphasizes qualitative assessment of academic accomplishments. This is why you are kindly asked to submit a short description of your three most important achievements (maximum a half page each). Besides research findings, these could also be extraordinary achievements in teaching and its further development, services in the benefit of the academic community or society, software development, patents, knowledge transfer and its practical application, spin-off companies or similar.*

ETH zürich

Assistant Professor (Tenure Track) of Engineering Geology

Main content

The Department of Earth Sciences (www.erdw.ethz.ch) at ETH Zurich invites applications for the above-mentioned position.

The professorship offers long-term funding to create and oversee an innovative research programme directed at engineering geology. Specific relevant disciplines include the geological aspects of engineered structures (tunnels, bridges, dams, landfills, nuclear repositories), development of near-surface resources (groundwater, geothermal energy, carbon sequestration and mineral deposits) and the assessment and mitigation of geohazards and georisks. The successful candidate will combine an array of approaches, e.g., field measurements, in-situ laboratories, remote sensing technology and numerical simulations at scales ranging from the laboratory to the large field scale. A strong analytical background is expected. She or he has a proven record of innovative research, and the ability to connect with companies and government agencies dealing with Engineering Geology topics of high societal relevance.

At the assistant professor level, commitment to teaching and the ability to lead a research group are expected. The new professorship will contribute to introductory and advanced courses in engineering geology, and teach relevant field and laboratory methods, albeit at the moderate level recommended by ETH for assistant professors.

Assistant professorships have been established to promote the careers of younger scientists. ETH Zurich implements a tenure track system equivalent to other top international universities. In exceptional circumstances we will also consider an appointment at the level of Full Professor.

The Department of Earth Sciences at ETH Zurich is actively striving to increase the number of women professors in order to build a more diverse scientific community.

Please apply online

Applications should include a curriculum vitae, a list of publications, a statement of future research and teaching interests, and a description of the three most important achievements. The letter of application should be addressed to the President of ETH Zurich, Prof. Dr. Joël Mesot. **The closing date for applications is 15 September 2021.** ETH Zurich is an equal opportunity and family friendly employer, strives to increase the number of women professors, and is responsive to the needs of dual career couples.

ΠΡΟΣΕΧΕΙΣ ΓΕΩΤΕΧΝΙΚΕΣ ΕΚΔΗΛΩΣΕΙΣ

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

DFI Deep Mixing, 5-8 July 2020, TBD, Gdansk, Poland, www.dfi.org/DM2020

II International Seminar "Tailings and Waste Rock Disposal", July 12 – 14, 2021, Lima, Peru, www.geoingenieria.org.pe

7th ICRAGEE International Conference on Recent Advances in Geotechnical Earthquake Engineering and Soil Dynamics, 12-17 July 2021, Bengaluru, India, http://7icragee.org

GEOCHINA 2021 - 6th GeoChina International Conference Civil & Transportation Infrastructures: From Engineering to Smart & Green Life Cycle Solution, July 19 to 21, 2021, Nan-Chang, China, http://geochina2021.geoconf.org

Keller Webinar Series: Groundwater Control, July 21, 2021, https://www.keller-na.com/events/keller-webinar-series-groundwater-control

PanAm Unsat 2021 3rd Pan-American Conference on Unsaturated Soils, 25-28 July 2021, Rio de Janeiro, Brazil, https://panamunsat2021.com

7th International Conference on Industrial and Hazardous Waste Management 27-30 July 2021, Chania, Crete, Greece, http://hwm-conferences.tuc.gr (online participation available)

ACE 2020 14th International Congress on Advances in Civil Engineering, 6-8 September 2021, Istanbul, Turkey, www.ace2020.org/en

XVIth International Congress AFTES 2021 Underground, a space for innovation, 6 to 8 September 2021, www.aftes2020.com

COMPLAS 2021 XVI International Conference on Computational Plasticity, Fundamentals and Applications, 7-10 September 2021, Barcelona, Spain, https://congress.cimne.com/complas2021/frontal/default.asp

RMEGV 2021 - 5th International Workshop on Rock Mechanics and Engineering Geology in Volcanic Fields, 9÷11 September 2021, Fukuoka, Japan, https://ec-convention.com/rmegv2021

International Conference on Textile Composites and Inflatable Structures (MEMBRANES 2021), 13-15 September 2021, Munich, Germany, https://congress.cimne.com/membranes2021/frontal/default.asp

EUROGEO WARSAW 2020 7th European Geosynthetics Congress, 19-22 September 2021, Warsaw, Poland, www.eurogeo7.org

37th General Assembly of the European Seismological Commission, 19-24 September 2021, Corfu, Greece, www.escgreece2020.eu

37th General Assembly of the European Seismological Commission, Session: Advances in engineering seismology stemming from practice.

EUROCK TORINO 2021 - ISRM European Rock Mechanics Symposium Rock Mechanics and Rock Engineering from theory to practice, 20-25 September 2021, Torino, Italy, http://eurock2021.com

This British Tunnelling Society "BTS 2020" Conference and Exhibition, Sept 30th - Oct 1st, 2021, London, United Kingdom, www.btsconference.com

EUROENGEO 3RD EUROPEAN REGIONAL CONFERENCE OF IAEG, 7 - 10 October 2021, Athens, Greece, www.euroengeo2020.org

10th International Conference on Scour and Erosion (ICSE-10), October 17-20, 2021, Arlington, Virginia, USA, www.engr.psu.edu/xiao/ICSE-10 Call for abstract.pdf

3rd International Symposium on Coupled Phenomena in Environmental Geotechnics, 20-22 October 2021, Kyoto, Japan, https://cpeg2020.org

ARMS11 11th Asian Rock Mechanics Symposium, Challenges and Opportunities in Rock Mechanics, 21-25 October 2021, Beijing, China, www.arms11.com

HYDRO 2021 Roles of hydro in the global recovery, 25-27 October 2021, Strasbourg, France, www.hydropower-dams.com/hydro-2021

EURO:TUN 2021 Computational Methods and Information Models in Tunneling, October 27th - 29th, 2021, Bochum, Germany, http://eurotun2021.rub.de

GFAC 2021 International Conference "Geotechnics fundamentals and applications in construction: investigations, design, technologies", October 27–29, 2021, Saint Petersburg, Russia https://gfac.spbgasu.ru

Emerging Technologies and Applications for Green Infrastructure, 28-29 October 2021, Ha Long, Vietnam, https://cigos2021.sciencesconf.org

5TH World Landslide Forum Implementation and Monitoring the USDR-ICL Sendai Partnerships 2015-2025, 2-6 November 2021, Kyoto, Japan, http://wlf5.iplhq.org

ICGE – Colombo – 2020 3rd International Conference in Geotechnical Engineering, 6-7 December 2021, Colombo, Sri Lanka, http://icgecolombo.org/2020/index.php

2nd International Conference TMM-CH Transdisciplinary Multispectral Modelling and Cooperation for the Preservation of Cultural Heritage - Rebranding The World In Crisis Through Culture, 12-15 December, 2021 Athens, Greece https://tmm-ch.com/

GeoAfrica 2021 - 4th African Regional Conference on Geosynthetics Geosynthetics in Sustainable Infrastructures and Mega Projects, 21-24 February 2022, Cairo, Egypt, https://geoafrica2021.org

https://16icge.uet.edu.pk/

ICEGT-2020 2nd International Conference on Energy Geotechnics, 10-13 April 2022, La Jolla, California, USA, https://icegt-2020.eng.ucsd.edu/home

2022 GEOASIA7 - 7th Asian Regional Conference on International Geosynthetics Society, April 11 - 15, 2022, Taipei, Taiwan, www.geoasia7.org

WTC 2022 World Tunnel Congress 2022 - Underground solutions for a world in change, 22-28 April 2022, Copenhagen, Denmark, www.wtc2021.dk

SYDNEY 7iYGEC 2021 7th International Young Geotechnical Engineers Conference A Geotechnical Discovery Down Under, 29 April - 1 May 2022, Sydney, Australia, http://icsmge2021.org/7iygec

SYDNEY ICSMGE 2021 20th International Conference on Soil Mechanics and Geotechnical Engineering, 1–5 May 2022, Sydney, Australia, www.icsgme2021.org

LARMS 2021 – IX Latin American Rock Mechanics Symposium Challenges in rock mechanics: towards a sustainable development of infrastructure, 15 – 18 May 2022, Asuncion, Paraguay, https://larms2021.com

CPT'22 5th International Symposium on Cone Penetration Testing, 8-10 June 2022, Bologna, Italy, http://cpt22.org

3rd European Conference on Earthquake Engineering and Seismology (3ECEES), 19-24 June 2022, Bucharest, Romania, https://3ecees.ro

3rd International Symposium on Geotechnical Engineering for the Preservation of Monuments and Historic Sites 22-24 June 2022, Napoli, Italy, https://tc301-napoli.org

9th International Congress on Environmental Geotechnics

Highlighting the role of Environmental Geotechnics in Addressing Global Grand Challenges
26-29 June 2022, Chania, Crete island, Greece
www.iceg2022.org

The 9th International Congress on Environmental Geotechnics is part of the well established series of ICEG. This conference will be held on an outstanding resort in the town of Chania of the island of Crete in Greece. The theme of the conference is "Highlighting the role of Environmental Geotechnics in Addressing Global Grand Challenges" and will highlight the leadership role of Geoenvironmental Engineers play on tackling our society's grand challenges.

Contact Information

- Contact person: Dr. Rallis Kourkoulis
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IS-Cambridge 2020 10th International Symposium on Geotechnical Aspects of Underground Construction in Soft Ground, 27 - 29 June 2022, Cambridge, United Kingdom, www.is-cambridge2020.eng.cam.ac.uk

UNSAT2022
8th International Conference on Unsaturated Soils
June or September 2022, Milos island, Greece

ICONHIC2022: THE STEP FORWARD - 3rd International Conference on Natural Hazards & Infrastructure, 5 – 7 July 2022, Athens, GREECE, https://iconhic.com/2021

16th International Conference of the International Association for Computer Methods and Advances in Geomechanics – IACMAG
01-08-2022 – 02-09-2022, Torino, Italy

Organiser: Politecnico di Torino
Contact person: Symposium srl
Address: via Gozzano 14
Phone: +390119211467
Email: info@symposium.it, marco.barla@polito.it

ISFOG 2020 4th International Symposium on Frontiers in Offshore Geotechnics, 28 – 31 August 2022, Austin, United States, www.isfog2020.org

11th International Symposium on Field Monitoring In Geomechanics
04-08 September 2022, London, United Kingdom

Organizer: TC220

Contact person: Dr Andrew Ridley; Email: andrew.ridley@geo-observations.com

The 17th Danube - European Conference on Geotechnical Engineering
5-7 September, 2022, Bucharest, Romania
https://sites.google.com/view/17decgero/home

Eurock 2022

Rock and Fracture Mechanics in Rock Engineering and Mining
12÷15 September 2022, Helsinki, Finland
www.ril.fi/en/events/eurock-2022.html

You are invited to reunite with your colleagues on solid bedrock at the EUROCK 2022 - *Rock and Fracture Mechanics in Rock Engineering and Mining* in Espoo, Helsinki-region, Finland, 12 to 15 September 2022. The conference themes include but are not limited to latest advances in rock mechanics, interesting mining and rock engineering cases, and engineering education. The call for papers is now open.

The conference will feature two main tracks: the scientific track and the industrial track. The presentations will be arranged in general and parallel sessions over two days. There will be short courses and workshops on the day preceding the conference and excursions to sites of interest on the day following the conference.

Should the COVID-19 situation allow, the conference will be held in the Dipoli conference center in Espoo near the Aalto University campus in the Helsinki region. The touristic city of Helsinki will be at your disposal with its underground and above ground marvels. Virtual participation with networking possibilities will be offered in parallel.

Themes

- Rock mass Characterization
- Geophysics in rock mechanics
- Mechanics of rock joints
- Jointed rock mass behaviour
- Rock support, probability based design
- Rock stress measurements
- Constitutive modelling of rock
- Rock drilling
- Blast induced fractures
- Rock engineering and mining education
- Geological disposal of spent nuclear fuel
- Recent advances in rock mechanics research
- Field and laboratory investigations
- Case studies

Contact Person: Lauri Uotinen
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IAEG XIV Congress 2022

Chengdu, China September 14-20, 2022

As a quadrennial global academic event initiated by the International Association for Engineering Geology and the Environment (IAEG), the IAEG Congress has been successfully held for 13 sessions, which aims to propagate the latest research results in the field of engineering geology and the environment, facilitate international academic exchanges and interdisciplinary integration, and promote the disciplinary construction of engineering geology and the environment. To further strengthen theoretical innovation, technological breakthrough and international cooperation in the field of engineering geology and the environment.

The XIV Congress of the International Association for Engineering Geology and the Environment will be held in **Chengdu Century City New International Convention and Exhibition Center**, Chengdu, China from **September**

14 to 20, 2022. Based on the theme of "**Engineering Geology for a Habitable Earth**", the congress is expected to enhance the disciplinary and research development of international engineering geology and the environment, and contribute to the advancement of major projects, ecological progress, and habitable earth with research and discussion in the engineering geology and global climate change, geological hazard assessment and prevention, geotechnical properties of rock and soil mass, engineering geology and the environmental issues concerning marine, transportation, urban and ecological environment protection in major projects, engineering geology and resilience engineering construction, intelligent engineering geology, and new theories, methods, and techniques in engineering geology, etc.

We warmly welcome the worldwide engineering geological community to come to Chengdu to participate in this academic event.

General scientific themes

- Climate Change Mitigation and Adaption
- Engineering Geology and Sustainable Development
- Mechanism, Monitoring and Early Warning, Prevention and Assessment of Geological Disasters
- Environmental Engineering Geology and Ecosystem Protection
- Geotechnical Properties of Rock and Soil Mass
- Traffic Engineering Geology and Sichuan-Tibet Railway Construction
- Energy Engineering Geology and Deep Earth Resource Exploitation
- Urban Engineering Geology and Underground Space Utilization
- Marine Engineering Geology and Coastal Development
- Polar, Planetary Engineering Geology and Disasters
- Artificial Intelligence, Big Data and Engineering Geology
- New Theory and Technology of Engineering Geology
- Preservation of Cultural Heritage and Engineering Geology
- Education and Disciplinary Development of Engineering Geology

Contacts

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28th European Young Geotechnical Engineers Conference and Geogames, 15 – 17 – 19 September 2022, Moscow, Russia, https://www.eygec28.com/?

6th Australasian Ground Control in Mining Conference – AusRock 2022
17 – 19 September 2022, Melbourne, Australia

Organizer: UNSW Sydney, AusIMM
Contact Person: Ismet Cambulat
E-mail: icambulat@unsw.edu.au

11th International Conference on Stress Wave Theory and Design and Testing Methods for Deep Foundations, 20 - 23 September 2022, De Doelen, Rotterdam, The Netherlands, https://www.kivi.nl/afdelingen/geotechniek/stress-wave-conference-2022

Rock Testing and Site Characterization
an ISRM International Symposium
16-19 October 2022, Asuncion, Paraguay
http://larms2022.com

It is with great pleasure and honor that we extend to you a warm invitation to attend the 2022 9th Latin American Rock Mechanics Symposium (LARMS IX), an International Society of Rock Mechanics International Symposium which will be held in Asuncion, Paraguay, from October 16-19, 2022!

The theme for LARMS IX is "Challenges in rock mechanics: towards a sustainable development of infrastructure". This event will provide a unique opportunity for meeting international experts from around the world and exchanging new ideas and exploring the future directions in the fields of rock mechanics, rock engineering, and geological engineering. The symposium will be preceded by two days of short courses and workshops, include industrial exhibitions, and post conference technical tours. Attractive programs will be provided for young researchers and students, including the student night, poster and paper competitions for students and young researchers/professionals.

Challenges in rock mechanics: towards a sustainable development of infrastructure

The IX Latin American Regional Conference of ISRM will host the conversation taking place worldwide regarding sustainable development. We hope to address the main challenges that arise in our discipline when faced with the massive needs of infrastructure, in particular in developing countries.

Topics will include but not be limited to the following:

- Rock mass characterization

- Geophysics applied to rock engineering
- Monitoring techniques
- Numerical methods and modeling in rock mechanics
- Environmental and safety issues in rock engineering and mining
- Soft rocks engineering and case histories
- Tunneling and deep excavations in rock
- Rock mechanics for energy infrastructure
- Petroleum and deep reservoir engineering
- Case histories in rock engineering (interdisciplinary case histories particularly encouraged)

Contact Info
Please send us a message if you have any questions.
info@larms2022.com

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/

Embracing the opportunity to provide world-leading professional development and networking opportunities to the global resources community, we are excited to announce the **AusRock Conference will be delivered in a hybrid event format**. Delegates will now be able to attend in person or access the conference content wherever they are in the world.

AusRock 2022 follows on from earlier conferences that have successfully covered the various aspects of geotechnical engineering servicing the mining industry and shared best practices.

The conference is a vehicle for information exchange between the coal and metalliferous sectors of the industry with a focus on new technologies and developments, industry needs and mine site problem solving, and practical case studies.

Conference themes

- Ground support – tendon systems, surface liners, injection systems in open cut and underground mining
- Alternative materials in ground control
- Geotechnical instrumentation, monitoring and data management
- Mine design – geotechnical considerations
- Geotechnical design methodologies
- Geomechanics of multiseam, multireef and complex orebodies
- Geotechnical challenges in extreme mining environments
- Backfill technologies
- Pillar design and performance
- Rock mass characterisation techniques and practice
- Regional stability
- Slope stability
- Geotechnical risk management
- Best practice case studies
- New challenges and innovations in ground control
- Numerical modelling in design
- Mine subsidence – prediction and control
- Caving mechanics and control
- Dynamic mining events and managing large deformations
- Geotechnical education and training

4th GeoAfrica Cairo - 2022

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

The International Geosynthetic Society in Egypt (IGSE) is pleased to announce that the 4th African Regional Conference on Geosynthetics shall take place in Cairo, Egypt in 2023. As a newly formed chapter of IGS, we are excited to initiate our activities with this important regional conference as a seed for future activities of IGSE. We are eager to host this event and look forward to regional and international participation from academics, consultants, producers, contractors, and project owners. The main aim of the conference is to engage regional and international experts to raise awareness of technical advances, participate in joint activities, exchange experiences, and build bridges. The event shall be held at one of the most inviting locations along the river Nile in Cairo. Due to the COVID 19 pandemic, the conference dates have been postponed from the original dates in October 2021 to 20-23 February 2023.

The use of geosynthetics in infrastructures and mega projects has immensely increased in Egypt and the region in recent years. Projects including major expansions of highways and railroads in challenging soil conditions, new cities and urban centers, industrial and commercial zones, ports, tank farms, landfills, mine tailings, and major utilities have seen extensive use of geosynthetic products in various applications. We have therefore chosen a conference theme to be "Geosynthetics in Sustainable Infrastructures and Mega Projects".

Technical Themes

- Geosynthetics in sustainable infrastructures and mega projects
- Reinforced soil walls and slopes
- Drainage and filtration
- Geosynthetics in transportation applications
- Geosynthetic barriers
- Hydraulic and coastal applications

- Innovation in geosynthetic products and applications
- Design and numerical modeling
- Durability and long-term performance

Contact Us

info@geoafrica2023.org

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

17th Asian Regional Geotechnical Engineering Conference
14-18 August 2023, Nur-Sultan, Kazakhstan

Organiser: Kazakhstan Geotechnical Society;
Contact person: Ms. Bibigul Abdrakhmanova;
Address: 2, Satpayev Street, Eurasian National University, Geotechnical Institute;
Phone: +7-7172- 34479;
Fax: +7-7172-353740;
Email: bibakgs@gmail.com; milanbi@mail.ru

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

15th ISRM
International Congress in Rock Mechanics
9÷14 October 2023, Salzburg, Austria

Organizer: Austrian Society for Geomechanics
Contact Person: Prof. Wulf Schubert
E-mail: salzburg@oegg.at

XVIII European Conference on Soil Mechanics and Geotechnical Engineering
25-30 August 2024, Lisbon, Portugal

Organiser: SPG
Contact person: SPG
Address: Av. BRASIL, 101
Email: spg@lnec.pt
Website: http://www.spgeotecnia.pt

ΕΝΔΙΑΦΕΡΟΝΤΑ ΓΕΩΤΕΧΝΙΚΑ ΝΕΑ

Massive sinkhole opens in southeastern Mexico

A giant sinkhole measuring 80 m (262 feet) in diameter has opened up on a field in southern Mexico on Saturday, May 29, 2021. No damage or injuries were reported, but a nearby home is at risk of being swallowed as the gaping hole continues to expand rapidly each day. Scientists are considering several hypotheses as the possible causes, including variations in the soil's water content.

The sinkhole appeared in the town of Juan C. Bonilla, Puebla State, in the southeastern region, according to state officials. It is estimated to be about 15 m (50 feet) deep.

Authorities said there were no reports of damage to structures or injuries, but a nearby home is at risk of being swallowed. The residents have been evacuated while the public was warned to stay away from the hole.

The homeowners said they heard a loud boom that sounded like thunder before the sinkhole appeared. They then saw the ground started sinking and water bubbling.

"We have nothing. We're not from here. We have no relatives. We're alone," said homeowner Heriberto Sanchez, who was originally from Veracruz State.

According to Beatriz Manrique, Puebla's environmental secretary, the sinkhole started at about 5 m (15 feet) in diameter, and then expanded over 24 hours. The hole then rapidly grew to 60 m (197 feet) on Monday, May 31.

As of Tuesday, June 1, the sinkhole measured 80 m (262 feet) in diameter.

(Julie Celestial / THE WATCHERS, June 2, 2021, https://watchers.news/2021/06/02/massive-sinkhole-opens-in-southeastern-mexico/)

WATCH: Sinkhole opens up in southeastern Mexico

https://www.standard.co.uk/video/international-news/huge-sinkhole-opens-up-in-southeastern-mexico-vf00f19e7

Massive sinkhole in Puebla continues to expand, now at 110 m (360 feet), Mexico

The enormous sinkhole in Puebla State, southeastern Mexico, has grown to 110 m (360 feet) in diameter as of Monday, June 7, 2021, prompting authorities to widen the security perimeter. The hole has already destroyed a nearby house's bedroom and part of a wall and is threatening to swallow the entire structure as continues to expand.

The sinkhole appeared in Santa María Zacatepec, in the town of Juan C. Bonilla, and is confirmed to be 9 m (30 feet) deep. It measured 80 m (262 feet) in diameter on May 29 and has grown rapidly ever since.

As of Monday, the sinkhole has grown another 13 m (43 feet), now measuring 110 m (360 feet) across at its widest point.

The Sánchez Xalamihua family, who owns the home near the sinkhole, said they heard a loud boom the day the sinkhole appeared.

"We heard something like a rumbling," Magdalena Xalamihua, the matriarch, told the media. "We thought it was fireworks, but we looked outside and saw the earth moving and water coming up, like waves. We ran."

(Julie Celestial / THE WATCHERS, June 9, 2021, https://watchers.news/2021/06/09/massive-sinkhole-in-puebla-continues-to-expand-now-at-110-m-360-feet-mexico/)

Landslide in Itanagar, India damaging the highway

Although heavy rainfall is to blamed for this landslide, but a proper drainage system and a concrete culvert could help preventing this costly collapse #Landslide #Flood

https://twitter.com/Mo_Heidarzadeh/status/1401259398043942912, Jun 5, 2021

Landslide risk management analysis on expansive residential areas – case study of La Marina (Alicante, Spain)

Isidro Cantarino, Miguel Angel Carrion, Jose Sergio Palencia-Jimenez, and Víctor Martínez-Ibáñez

Abstract

Urban expansion is a phenomenon that has been observed since the mid-20th century in more developed regions. One aspect of it is the urban development of holiday resorts with second homes that generally appeared following world political stabilisation. This residential expansion has often happened with scarce control, especially in its early stages, allowing areas to be occupied that are not so suitable in terms of the environment, culture and landscape, not to mention the very geological risks of flooding, earthquakes and landslides. Indeed, the risk of landslides for buildings occupying land in zones at such risk is not a matter solely attributable to the geomorphological characteristics of the land itself, nor is it simply a question of chance; it is also due to its management of such land, generally because of a lack of specific regulations. This study aims to lay down objective criteria to find how suitable a specific local entity's risk management is by looking at the evolution of its urban development procedures. It also aims to determine what causes the incidence of landslide risk (geomorphology, chance, land management, etc.) and finally to suggest control tools for the public bodies tasked with monitoring such matters.

Cantarino, I., Carrion, M. A., Palencia-Jimenez, J. S., and Martínez-Ibáñez, V.: Landslide risk management analysis on expansive residential areas – case study of La Marina (Alicante, Spain), Nat. Hazards Earth Syst. Sci., 21, 1847–1866, https://doi.org/10.5194/nhess-21-1847-2021, 2021.

https://nhess.copernicus.org/articles/21/1847/2021/

Jerusalem sinkhole may be linked to tunnel construction

An enormous sinkhole which opened up in a Jerusalem hospital car park and completely swallowed-up three cars in just 15 seconds may have been caused by nearby tunnelling.

The disaster, captured by hospital CCTV, occurred on Monday 7 June at the city's Shaare Zedek Medical Centre. According to The Times of Israel, medical centre director Dr Ofer Martin said the sinkhole appeared to have been caused by the digging of a tunnel for Highway 16 (Photo: Israel Police video). More on this story at: https://lnkd.in/g-MHRDN

Local media reported that the tunnel, which runs very close to the hospital and its car park, had suffered a partial collapse. The Ministry of Jerusalem and Heritage is currently investigating whether there is a link between the sinkhole and the digging of the tunnel.

Police later confirmed there were no injuries resulting from the incident and cordoned-off the hospital vicinity, declaring it a 'danger zone'.

(Tunnels and Tunnelling, 8 June 2021, http://www.tunnelsonline.info/news/jerusalem-sinkhole-may-be-linked-to-tunnel-construction-8803385/

Tunnels of Claudius, Avezzano, Italy

This Roman underground canal was the longest tunnel ever built until the late 19th-century.

In ancient times, Fucine Lake in Abruzzo, Central Italy, was a large endorheic lake with no natural outflow. The lake provided fish and fertile soil but was also the source of malaria

and frequently flooded, so the Romans tried to drain the entire basin.

To accomplish this ambitious goal, Roman Emperor Claudius commissioned the construction of a system of canals, tunnels, and wells between 41 and 52 CE. Over 30,000 slaves and workmen are believed to have manually dug the tunnel system.

The main underground canal is a little over three miles (six kilometers) long and was the longest tunnel of its time, until the construction of the Fréjus Rail Tunnel in 1871. The hydraulic works allowed water to flow out of the Fucine Lake into the Liri River on the other side of the mountain. To celebrate the inauguration of the tunnel and the drainage of the lake, Claudius organized a naval battle to be held in the basin.

Thanks to these works, the water level was lowered, but never completely emptied. After the fall of the Roman empire, lack of maintenance and earthquakes damaged the structures and the lake returned to previous levels, before being drained in 1878. The ancient tunnel area has since been turned into an archaeological park.

(Atlas Obscura, https://www.atlasobscura.com/places/tunnels-of-claudius)

ΕΝΔΙΑΦΕΡΟΝΤΑ - ΣΕΙΣΜΟΙ & ΑΝΤΙΣΕΙΣΜΙΚΗ ΜΗΧΑΝΙΚΗ

Tsunami damage to ports: cataloguing damage to create fragility functions from the 2011 Tohoku event

Constance Ting Chua[2], Adam D. Switzer, Anawat Suppasri, Linlin Li, Kwanchai Pakoksung, David Lallemant, Susanna F. Jenkins, Ingrid Charvet, Terence Chua, Amanda Cheong, and Nigel Winspear

Abstract

Modern tsunami events have highlighted the vulnerability of port structures to these high-impact but infrequent occurrences. However, port planning rarely includes adaptation measures to address tsunami hazards. The 2011 Tohoku tsunami presented us with an opportunity to characterise the vulnerability of port industries to tsunami impacts. Here, we provide a spatial assessment and photographic interpretation of freely available data sources. Approximately 5000 port structures were assessed for damage and stored in a database. Using the newly developed damage database, tsunami damage is quantified statistically for the first time, through the development of damage fragility functions for eight common port industries. In contrast to tsunami damage fragility functions produced for buildings from an existing damage database, our fragility functions showed higher prediction accuracies (up to 75 % accuracy). Pre-tsunami earthquake damage was also assessed in this study and was found to influence overall damage assessment. The damage database and fragility functions for port industries can inform structural improvements and mitigation plans for ports against future events.

How to cite.

Chua, C. T., Switzer, A. D., Suppasri, A., Li, L., Pakoksung, K., Lallemant, D., Jenkins, S. F., Charvet, I., Chua, T., Cheong, A., and Winspear, N.: Tsunami damage to ports: cataloguing damage to create fragility functions from the 2011 Tohoku event, Nat. Hazards Earth Syst. Sci., 21, 1887–1908, https://doi.org/10.5194/nhess-21-1887-2021, 2021.

https://nhess.copernicus.org/articles/21/1887/2021/

World's longest recorded earthquake lasted for 32 years

The devastating M8.5 earthquake that shook Sumatra, Indonesia, in 1861 was long believed to be a sudden rupture on a previously quiescent fault. However, new research showed that tectonic plates below the island had been slowly crashing against each other for 32 years prior to the catastrophic event. The silent earthquake, known as a slow-slip event, was the longest sequence of its kind ever detected on Earth.

Slow-slip earthquakes occur when two segments of crust move against each other. Some faults are now being monitored for a slow slip with GPS technology or seismic instruments, but it was difficult back then to trace such events on remote faults or before the GPS became available.

Near the Simeulue island off the coast of Sumatra, coral growth patterns record the up and down movements along the fault of the 1861 earthquake, providing scientists a window to the history of the fault between 1738 to 1861.

Researchers from the Nanyang Technological University (NTU) in Singapore identified the event by studying coral along the fault line.

Coral cannot grow when exposed to the air, so layers of dead coral can also unveil sea levels. When the local sea-level changes as a result of tectonics, the changes become visible in corals' skeletal growth records, explained Rishav Mallick, a doctoral student at the NTU and the study's lead author, said wh

The corals reveal that Simeulue had been subsiding for 90 years steadily by up to 2 mm (0.07 inches) every year, which is consistent with the fault's background motion.

However, around 1829, it suddenly started sinking up to seven times faster, Mallick said. This suggests that the fault had started to move in a slow-slip earthquake. "It's a very sharp change," he added. The rapid subsidence continued until the devastating 1861 earthquake.

For a long time, "the assumption was that, between the big earthquakes, the system was simple": two sections of crust get locked against each other at the fault, building up strain until—crack—they break free with an earthshaking shudder," Kevin Furlong, a geoscientist at Pennsylvania State University, who was not involved in the study.

If a slow-slip motion is missed, researchers may miscalculate where the strains are on a fault and how strong the fault can produce a quake. "Once we can better define the locked region, we can better define the magnitude of an earthquake that can occur."

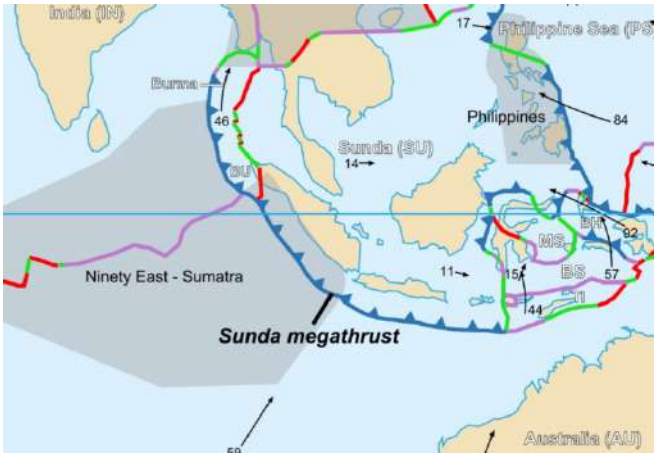


Image: Plate tectonic of Sunda Megathrust, Indonesia.

Reference

"Long-lived shallow slow-slip events on the Sunda megathrust" - Mallick, R., et al. - Nature Geoscience - https://doi.org/10.1038/s41561-021-00727-y

(Julie Celestial / THE WATCHERS, June 4, 2021, https://watchers.news/2021/06/04/longest-recorded-earthquake-lasted-for-32-years/)

Long-lived shallow slow-slip events on the Sunda megathrust

Rishav Mallick, Aron J. Meltzner, Louisa L. H. Tsang, Eric O. Lindsey, Lujia Feng & Emma M. Hill

Abstract

During most of the time between large earthquakes at tectonic plate boundaries, surface displacement time series are generally observed to be linear. This linear trend is interpreted as a result of steady stress accumulation at frictionally locked asperities on the fault interface. However, due to the short geodetic record, it is still unknown whether all interseismic periods show similar rates, and whether frictionally locked asperities remain stationary. Here we show that two consecutive interseismic periods at Simeulue Island, Indonesia experienced significantly different displacement rates, which cannot be explained by a sudden reorganization of locked and unlocked regions. Rather, these observations necessitate the occurrence of a 32-year slow-slip event on a shallow, frictionally stable area of the megathrust. We develop a self-consistent numerical model of such events driven by pore-fluid migration during the earthquake cycle. The resulting slow-slip events appear as abrupt velocity changes in geodetic time series. Due to their long-lived nature, we may be missing or mis-modelling these transient phenomena in a number of settings globally; we highlight one such ongoing example at Enggano Island, Indonesia. We provide a method for detecting these slow-slip events that will enable a substantial revision to the earthquake and tsunami hazard and risk for populations living close to these faults.

(Julie Celestial / THE WATCHERS, June 4, 2021, https://watchers.news/2021/06/04/longest-recorded-earthquake-lasted-for-32-years/)

Ancient Scottish tsunami could destroy entire towns if it happened today, new study finds

A new study led by researchers at the Universities of Sheffield, St Andrews and York has revealed that the Storegga tsunami that hit Scotland's coastline 8,200 years ago, could devastate entire towns if it happened today.

https://www.youtube.com/watch?v=z4FY0rTp0qo

- A new study by Universities of Sheffield, St Andrews and York researchers suggest the ancient Storegga tsunami would have devastated entire coast-lines
- The study models for the first time how far the tsunami would have travelled inland when it originally occurred 8,200 years ago
- Study suggests a modern-day tsunami of the same magnitude would have worse consequences today due to denser populations and higher sea levels
- The Storegga tsunami is considered to be the largest natural catastrophe to happen the UK in the last 11,000 years

A new study led by researchers at the Universities of Sheffield, St Andrews and York has revealed that the Storegga tsunami that hit Scotland's coastline 8,200 years ago, could devastate entire towns if it happened today.

The findings suggest that should an event of the same magnitude happen on the coastline again today, many of our coastal towns and cities could be completely devastated.

Although the tsunami is considered to be the largest natural catastrophe to happen in the UK in the last 11,000 years, this is the first time that researchers have been able to model the inland impact of the ancient wave.

Using sedimentology and dating tsunami sediment deposits at Maryton, Aberdeenshire using luminescence, the study was able to determine the age, number and relative power of the tsunami waves. The researchers were then able to create models that show the wave would have travelled up to 30 kilometres inland along the Scottish coast. Areas such as Montrose, a town encompassing a coastal lagoon, nature reserve and a population of 12,000, would have been completely devastated.

While 600 km of the Scottish coastline was affected by the tsunami thousands of years ago, the modern-day impact would have graver consequences as a result of denser populations along the coastline and higher sea levels.

The tsunami was caused by the shifting of glacial and interglacial sediments on the coastal slopes at Storegga, along Norway's continental shelf in the Norweigan sea. This slide displaced sea water levels and triggered a 95,000 sq km submarine slide that led to the resulting tsunami height reaching up to 30 metres.

> Although the Storegga Tsunami has been known about for years, this is the first time we have been able to model how far inland from Scotland's coastline the tsunami wave travelled by analysing the soil deposits left by the wave over 8000 years ago.
>
> Professor Mark Bateman
>
> Lead Author from the University of Sheffield's Department of Geography

"Though there is no similar threat from Norway today, the UK could still be at risk from flooding events from potential volcanic eruptions around the world, such as those predicted in the Canary Islands.

"These would cause a similar resulting tsunami wave due to the amount of material that would be displaced by the volcano. These models give us a unique window into the past to see how the country was, and could be affected again"

Professor Dave Tappin, of the British Geological Survey, commented on the study. He said: "30 years ago, identifying the Storegga tsunami flooding, that struck the coast of eastern Scotland over 8,000 years ago, was seminal

in recognising that submarine landslides are a major hazard in triggering significant flood events.

"From the Montrose area, the new detailed analysis of the sediments deposited by the tsunami wave and their age dating using novel methods, together with the new numerical tsunami modelling of the wave impact on-land, provides important new insights into the understanding of the Storegga tsunami flood.

"The research highlights the importance of applying new scientific techniques to older-studied events, thereby improving our knowledge of their impact."

(Rebecca Ferguson / Media and PR Officer / Corporate Communications / The University of Sheffield, 4 June 2021, https://www.sheffield.ac.uk/news/ancient-scottish-tsunami-could-destroy-entire-towns-if-it-happened-today-new-study-finds)

Detailing the impact of the Storegga Tsunami at Montrose, Scotland

Mark D. Bateman, Tim C. Kinnaird, Jon Hill, Robert A. Ashurst, Jenna Mohan, Rebecca B. I. Bateman, Ruth Robinson

Abstract

The Storegga tsunami, dated in Norway to 8150±30 cal. years BP, hit many countries bordering the North Sea. Run-ups of >30 m occurred and 1000s of kilometres of coast were impacted. Whilst recent modelling successfully generated a tsunami wave train, the wave heights and velocities, it underestimated wave run-ups. Work presented here used luminescence to directly date the Storegga tsunami deposits at the type site of Maryton, Aberdeenshire in Scotland. It also undertook sedimentological characterization to establish provenance, and number and relative power of the tsunami waves. Tsunami model refinement used this to better understand coastal inundation. Luminescence ages successfully date Scottish Storegga tsunami deposits to 8100±250 years. Sedimentology showed that at Montrose, three tsunami waves came from the northeast or east, over-ran pre-existing marine sands and weathered igneous bedrock on the coastal plain. Incorporation of an inundation model predicts well a tsunami impacting on the Montrose Basin in terms of replicate direction and sediment size. However, under-estimation of run-up persisted requiring further consideration of palaeotopography and palaeo-near-shore bathymetry for it to agree with sedimentary evidence. Future model evolution incorporating this will be better able to inform on the hazard risk and potential impacts for future high-magnitude submarine generated tsunami events.

The Storegga tsunami event might be considered the largest natural disaster to hit countries around the North Sea during the last 10 000 years. It was caused by a submarine slide off of the continental slope of southwestern Norway (Fig. 1; Haflidason *et al*. 2005) which displaced water generating a tsunami event (Harbitz *et al*. 2006). Deposits associated with the Storegga tsunami have been reported from sites as far apart as Norway, Scotland, and eastern Greenland (Fig. 1A; e.g. Dawson *et al*. 1988, 2020; Svendsen & Mangerud 1990; Bondevik *et al*. 1997, 2005a; Smith *et al*. 2004, 2007; Wagner *et al*. 2010; Fruergaard *et al*. 2015; Long *et al*. 2016). The Storegga tsunami has even been connected with the final demise of Mesolithic occupation of Doggerland in the North Sea (e.g. Weninger *et al*. 2008). Proximal sites experienced tsunami wave run-up of up to 13 m and distal sites 3–5 m (Fig. 1A; Smith *et al*. 2004; Bondevik *et al*. 2005a; Fruergaard *et al*. 2015; Rasmussen *et al*. 2018). Where localized coastal configuration caused diffraction, refraction, reflection and interference, e.g. in island archipelagos like the Shetland Islands, minimum run-ups of >30 m have been reported (Dawson *et al*. 2020). Reconstructions have calculated that some 13 600 km^2 of coastal plain in the southern North Sea, from Denmark round to Scotland (but excluding Norway), would have been vulnerable to flooding from the Storegga tsunami (Weninger *et al*. 2008). In Scotland alone, at least 600 km of coastline was thought to have been impacted with inundation extending several kilometres inland in places (Smith *et al*. 2004).

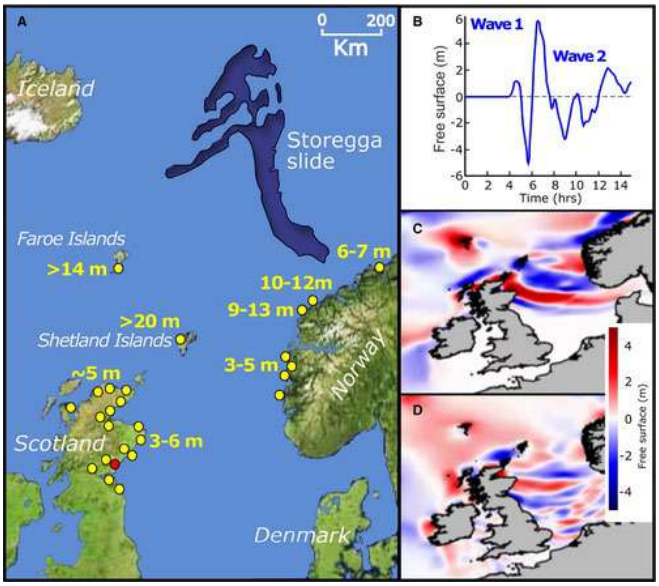
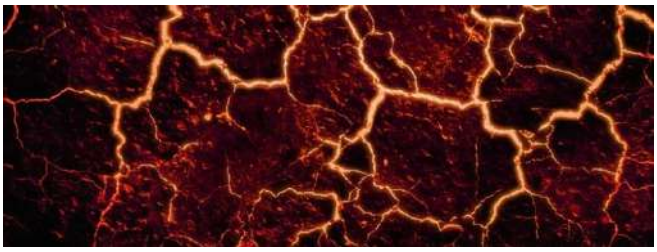


Fig. 1. The Storegga tsunami. A. Location of slide causing tsunami (based on Haflidason *et al*. 2005), location of coastal sites where tsunami deposits reported and estimated wave heights (based on Bondevik *et al*. 2005a,b; Long *et al*. 2016; Dawson *et al*. 2020). Montrose Basin in eastern Scotland shown as red circle. B. Modelled tsunami wave gauge using modern bathymetry for eastern Scotland (Hill *et al*. 2014). C and D. Modelled tsunami wave map showing distribution of first and second major waves to hit Scotland (Hill *et al*. 2014).

BOREAS An International Journal of Quaternary research, 03 June 2021, https://doi.org/10.1111/bor.12532. ISSN 0300-9483.

https://onlinelibrary.wiley.com/doi/full/10.1111/bor.12532

New study solves mystery behind Earth's deepest earthquakes



The cause of the deepest earthquakes on Earth has been a mystery to scientists for more than a century.

In a new study, a team of scientists may have solved the case by identifying water as the key factor that causes deep-focus quakes.

Most earthquakes occur near the Earth's surface, down to around 70 km (43 miles). These happen when stress builds up at a fracture between two blocks of rock or a fault, causing them to slide abruptly past each other.

However, deeper into the Earth, intense pressures generate too much friction to allow this kind of sliding to happen and the high temperatures improve the ability of rocks to deform to accommodate changing stresses.

Although theoretically unexpected, scientists have been able to determine earthquakes that originate more than 300 km (186 miles) below the surface since the 1920s.

"The big problem that seismologists have faced is how it's possible that we have these deep-focus earthquakes at all," said Carnegie scientist Lara Wagner.

"Once you get a few tens of kilometers down, it becomes incredibly difficult to explain how we are getting a slip on a fault when the friction is so incredibly high."

Ongoing studies over the past several decades have shown that water plays a key role in intermediate-depth earthquakes or those that occur between 70 and 300 km (43 and 186 miles) below Earth's surface. In these instances, water is released from minerals, which weakens the rock around the fault and allows the blocks of rocks to slip.

But scientists didn't think this phenomenon could also explain deep-focus earthquakes because it was previously thought that water and other fluid-creating compounds couldn't make it far enough down the Earth's interior to generate a similar effect.

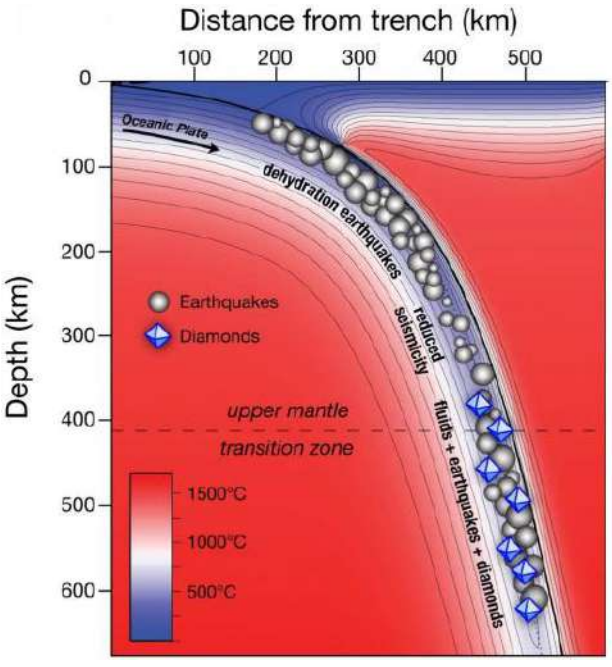


Image credit: Shirey, et al.

"Diamonds form in fluids. If diamonds are there, fluids are there," said co-author Steven Shirey.

The diamond's inclusions had the instinct chemical signature of similar materials found in oceanic crust, which means that the water and other materials were not created deep in the Earth's interior but instead, carried down as part of a sinking ocean plate.

"The seismology community had moved away from the idea that there could be water that deep. But diamond petrologists like Steve were showing us samples and saying 'No, no, no.' There's definitely water down here' So then we all had to get together to figure out how it got down there," Wagner said.

Wagner, along with co-author Peter van Keken, tested the idea with advanced computational models to simulate temperatures of sinking plates at greater depths than what had been attempted before. The team showed that even though warmer plates did not hold water, the minerals in the colder plates could carry water to the depths associated with deep-focus earthquakes.

"The nature of deep earthquakes is one of the big questions in geoscience," said Shirey.

The study is unusual in applying four different disciplines--which are geochemistry, seismology, geodynamics, and petrology-- to the same question.

"We needed all four of these different disciplines to come together to make this argument. It turned out we had them all in-house at Carnegie," he added.

Reference

"Slab Transport of Fluids to Deep Focus Earthquake Depths—Thermal Modeling Constraints and Evidence From Diamonds" - Shirey, S. B., et al. - AGU Advances - https://doi.org/10.1029/2020AV000304

Slab Transport of Fluids to Deep Focus Earthquake Depths—Thermal Modeling Constraints and Evidence From Diamonds

Steven B. Shirey, Lara S. Wagner, Michael J. Walter, D. Graham Pearson, Peter E. van Keken

Abstract

The nature and cause of deep earthquakes remain enduring unknowns in the field of seismology. We present new models of thermal structures of subducted slabs traced to mantle transition zone depths that permit a detailed comparison between slab pressure/temperature (P/T) paths and hydrated /carbonated mineral phase relations. We find a remarkable correlation between slabs capable of transporting water to transition zone depths in dense hydrous magnesium silicates with slabs that produce seismicity below ~300-km depth, primarily between 500 and 700 km. This depth range also coincides with the P/T conditions at which oceanic crustal lithologies in cold slabs are predicted to intersect the carbonate-bearing basalt solidus to produce carbonatitic melts. Both forms of fluid evolution are well represented by sublithospheric diamonds whose inclusions record the existence of melts, fluids, or supercritical liquids derived from hydrated or carbonate-bearing slabs at depths (~300–700 km) generally coincident with deep-focus earthquakes. We propose that the hydrous and carbonated fluids released from subducted slabs at these depths lead to fluid-triggered seismicity, fluid migration, diamond precipitation, and inclusion crystallization. Deep focus earthquake hypocenters could track the general region of deep fluid release, migration, and diamond formation in the mantle. The thermal modeling of slabs in the mantle and the correlation between sublithospheric diamonds, deep focus earthquakes, and slabs at depth demonstrate a deep subduction pathway to the mantle transition zone for carbon and volatiles that bypasses shallower decarbonation and dehydration processes.

(Julie Celestial / THE WATCHERS, June 5, 2021, https://watchers.news/2021/06/05/new-study-solves-mystery-behind-earth-s-deepest-earthquakes/)

Ultra-long period and small-amplitude tsunami generated following the July 2020 Alaska M_w7.8 tsunamigenic earthquake

Mohammad Heidarzadeh & Iyan E.Mulia

Highlights

- July 2020 Alaska tsunami from M7.8 earthquake has ultra-long period of 51–64 min.
- The coastal amplitude of the tsunami was ~0.5 m which is unusually small.
- Ultra-long period of the tsunami is due to generation in shallow water (~150 m).
- Small coastal amplitude is due to deep earthquake (28 km) and shallow water (~150 m).

Abstract

The July 2020 M_w7.8 Alaska tsunamigenic earthquake was a fresh call for potential large tsunamis associated with the Aleutian subduction zone. The second largest ever-recorded earthquake worldwide (M_w 9.2) occurred in this zone in 1964 indicating its massive earthquake and tsunami risk. Our analysis of the July 2020 tsunami revealed that it involves very long period waves (51–64 min) which is unusual for an M_w7.8 earthquake. The tsunami coastal amplitude was small (~0.5 m) which is much smaller than that usually expected from a tsunamigenic earthquake of this size. Here, through numerical simulations and spectral analyses, we explain the ultra-long period and small amplitude waves of the tsunami. Our analysis using an analytical equation showed that the ultra-long period of the tsunami (51–64 min) can be reproduced using the shallow water depth around the source region (100–200 m) and the length of the coseismic deformation area (~100 km). By comparing the coastal amplitude of this event with four other similar-size and similar-mechanism earthquakes (thrust M_w7.8), we attribute the relatively small coastal amplitude of this tsunami to the deep focal depth of the earthquake (28 km) and the extremely shallow water around the source region.

https://doi.org/10.1016/j.oceaneng.2021.109243

https://www.sciencedirect.com/science/article/pii/S0029801821006697?via%3Dihub

Geotechnical Reconnaissance of the 2016 Mw6.3 Meinong Earthquake, Taiwan

Joseph Sun, Tara Hutchinson, Kevin Clahan, Farnyuh Menq, Eric Lo, Wen-Jong Chang, Chi-Chin Tsai, Kuo-Fong Ma

Geotechnical Extreme Events Reconnaissance (GEER) Association - Report No. GEER-046

In response to the heavy damage reported for the Mw 6.3 (ML 6.4) Meinong Earthquake that hit southern Taiwan at 3:37 am local time, February 6, 2016 (11:57 am February 5, 2016, Pacific Standard Time), the GEER Steering Committee dispatched a reconnaissance team to Taiwan. The reconnaissance team was selected and formed on Monday (February 8, 2016), departed for Taiwan on Friday (February 13, 2016), and arrived and started their reconnaissance effort on Sunday (February 14, 2016) after the conclusion of rescue and recovery effort. The reconnaissance effort continued for about a week and the team returned on February 20, 2016.

…

There were some unexpected structural performances, geographical damage patterns, and liquefaction manifestation from the Meinong earthquake compared with prior earthquakes of similar magnitude. As such, this reconnaissance placed emphasis on the following:

- Seismic source characterization
- Influence of geology, structure, and local soil conditions on ground motions
- Liquefaction of fine-grained sands and silty sands
- Performance of buildings and foundations in liquefied soils
- Performance of non-symmetrical and soft story buildings

1.4 Report Organization

Reconnaissance findings are presented in a two-part series. With the first part organized as a conventional report, summarizing the event, geologic setting, seismology, ground response, including the specific detailing of liquefaction-induced damage and a summary of the performance of buildings, slopes, and dams. The second part, provided herein offers a unique "virtual" perspective of the sites visited by the team whereby remote sensing equipment was deployed. This Part 2 report includes compressed 3D-models of key sites that are either interactive or representative of fly-throughs of full-resolution models.

…

(162 p.)

https://drive.google.com/file/d/1cYScRd-mJJvj6WyKIgSYkqZLg2DVauaK_/view

Characterisation of fault plane and coseismic slip for the May 2, 2020, Mw 6.6 Cretan Passage earthquake from tide-gauge tsunami data and moment tensor solutions

Enrico Baglione, Stefano Lorito, Alessio Piatanesi, Fabrizio Romano, Roberto Basili, Beatriz Brizuela, Roberto Tonini, Manuela Volpe, Hafize Basak Bayraktar, and Alessandro Amato

Abstract. We present a source solution for the tsunami generated by the Mw 6.6 earthquake that occurred on May 2, 2020, about 807thinsp;km offshore south of Crete, in the Cretan Passage, on the shallow portion of the Hellenic Arc Subduction Zone (HASZ). The tide-gauges recorded this local tsunami on the southern coast of Crete island and Kasos island. We used these tsunami observations to constrain the geometry and orientation of the causative fault, the rupture

mechanism and the slip amount. We first modelled an ensemble of synthetic tsunami waveforms at the tide-gauge locations, produced for a range of earthquake parameter values as constrained by some of the available moment tensor solutions. We allow for both a splay and a back-thrust fault, corresponding to the two nodal planes of the moment tensor solution. We then measured the misfit between the synthetic and the observed marigrams for each source parameter set. Our results identify the shallow steeply-dipping back-thrust fault as the one producing the lowest misfit to the tsunami data. However, a rupture on a lower angle fault, possibly a splay fault, with a sinistral component due to the oblique convergence on this segment of the HASZ, cannot be completely ruled out. This earthquake reminds us that the uncertainty regarding potential earthquake mechanisms at a specific location remains quite significant. In this case, for example, it is not possible to anticipate if the next event will be one occurring on the subduction interface, on a splay fault, or on a back-thrust which seems the most likely for the event under investigation. This circumstance bears important consequences because back-thrust and splay faults might enhance the tsunamigenic potential with respect to the subduction interface due to their steeper dip. Then, these results are relevant for tsunami forecasting both in the framework of the long-term hazard assessment and of the early warning systems.

How to cite. Baglione, E., Lorito, S., Piatanesi, A., Romano, F., Basili, R., Brizuela, B., Tonini, R., Volpe, M., Bayraktar, H. B., and Amato, A.: Characterisation of fault plane and coseismic slip for the May 2, 2020, Mw 6.6 Cretan Passage earthquake from tide-gauge tsunami data and moment tensor solutions, Nat. Hazards Earth Syst. Sci. Discuss. [preprint], https://doi.org/10.5194/nhess-2021-183, in review, 2021.

https://nhess.copernicus.org/preprints/nhess-2021-183/

ΕΝΔΙΑΦΕΡΟΝΤΑ - ΓΕΩΛΟΓΙΑ

The Earth Has a Pulse: 27.5-Million-Year Cycle of Geological Activity Discovered

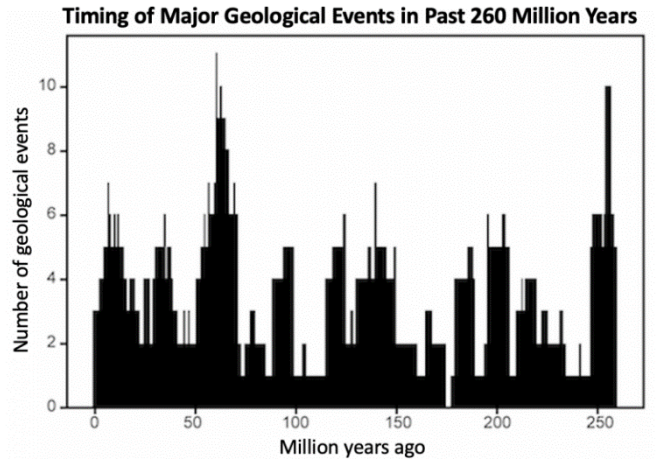
Analysis of 260 million years of major geological events finds recurring clusters 27.5 million years apart.

Geologic activity on Earth appears to follow a 27.5-million-year cycle, giving the planet a "pulse," according to a new study published in the journal *Geoscience Frontiers*.

"Many geologists believe that geological events are random over time. But our study provides statistical evidence for a common cycle, suggesting that these geologic events are correlated and not random," said Michael Rampino, a geologist and professor in New York University's Department of Biology, as well as the study's lead author.

Over the past five decades, researchers have proposed cycles of major geological events — including volcanic activity and mass extinctions on land and sea — ranging from roughly 26 to 36 million years. But early work on these correlations in the geological record was hampered by limitations in the age-dating of geologic events, which prevented scientists from conducting quantitative investigations.

However, there have been significant improvements in radioisotopic dating techniques and changes in the geologic timescale, leading to new data on the timing of past events. Using the latest age-dating data available, Rampino and his colleagues compiled updated records of major geological events over the last 260 million years and conducted new analyses.



NYU researchers found that global geologic events are generally clustered at 10 different timepoints over the 260 million years, grouped in peaks or pulses of roughly 27.5 million years apart. Credit: Rampino et al., Geoscience Frontiers

The team analyzed the ages of 89 well-dated major geological events of the last 260 million years. These events include marine and land extinctions, major volcanic outpourings of lava called flood-basalt eruptions, events when oceans were depleted of oxygen, sea-level fluctuations, and changes or reorganization in the Earth's tectonic plates.

They found that these global geologic events are generally clustered at 10 different timepoints over the 260 million years, grouped in peaks or pulses of roughly 27.5 million years apart. The most recent cluster of geological events was approximately 7 million years ago, suggesting that the next pulse of major geological activity is more than 20 million years in the future.

The researchers posit that these pulses may be a function of cycles of activity in the Earth's interior — geophysical processes related to the dynamics of plate tectonics and climate. However, similar cycles in the Earth's orbit in space might also be pacing these events.

"Whatever the origins of these cyclical episodes, our findings support the case for a largely periodic, coordinated, and intermittently catastrophic geologic record, which is a departure from the views held by many geologists," explained Rampino.

Reference: "A pulse of the Earth: A 27.5-Myr underlying cycle in coordinated geological events over the last 260 Myr" by Michael R. Rampino, Ken Caldeira and Yuhong Zhu, 17 June 2021, *Geoscience Frontiers*. DOI: 10.1016/j.gsf.2021.101245

(New York University, SciTechDaily, June 20, 2021, https://scitechdaily.com/the-earth-has-a-pulse-27-5-million-year-cycle-of-geological-activity-discovered/)

A pulse of the Earth: A 27.5-Myr underlying cycle in coordinated geological events over the last 260 Myr

Michael R.Rampino, KenCaldeira, YuhongZhu

Highlights

- Ages of 89 major geological events during last 260 Myr.
- Fourier analysis shows spectral peak at 27.5 Myr.
- A significant shorter period of ~ 9 Myr to 10 Myr.
- Global geologic activity in pulses with an underlying ~ 27.5-Myr cycle.

Abstract

We performed spectral analyses on the ages of 89 well-dated major geological events of the last 260 Myr from the recent geologic literature. These events include times of marine and non-marine extinctions, major ocean-anoxic events, continental flood-basalt eruptions, sea-level fluctuations, global pulses of intraplate magmatism, and times of changes in sea-floor-spreading rates and plate reorganizations. The aggregate of all 89 events shows ten clusters in the last 260 Myr, spaced at an average interval of ~ 26.9 Myr, and Fourier analysis of the data yields a spectral peak at 27.5 Myr at the ≥ 96% confidence level. A shorter period of ~ 8.9 Myr may also be significant in modulating the timing of geologic events. Our results suggest that global geologic events are

generally correlated, and seem to come in pulses with an underlying ~ 27.5-Myr cycle. These cyclic pulses of tectonics and climate change may be the result of geophysical processes related to the dynamics of plate tectonics and mantle plumes, or might alternatively be paced by astronomical cycles associated with the Earth's motions in the Solar System and the Galaxy.

https://www.sciencedirect.com/science/article/pii/S1674987121001092?via%3Dihub

ΕΝΔΙΑΦΕΡΟΝΤΑ - ΠΕΡΙΒΑΛΛΟΝ

There's a new ocean now—can you name all 5?

The Gerlache Strait lies off the west coast of the Antarctic Peninsula, in the large band of ocean around Antarctica that has been reclassified as the Southern Ocean by National Geographic cartographers. The strait would once have been considered part of the Pacific.

On World Oceans Day, Nat Geo cartographers say the swift current circling Antarctica keeps the waters there distinct and worthy of their own name: the Southern Ocean.

Those familiar with the Southern Ocean, the body of water encircling Antarctica, know it's unlike any other.

"Anyone who has been there will struggle to explain what's so mesmerizing about it, but they'll all agree that the glaciers are bluer, the air colder, the mountains more intimidating, and the landscapes more captivating than anywhere else you can go," says Seth Sykora-Bodie, a marine scientist at the National Oceanic and Atmospheric Administration (NOAA) and a National Geographic Explorer.

Since National Geographic began making maps in 1915, it has recognized four oceans: the Atlantic, Pacific, Indian, and Arctic Oceans. Starting on June 8, World Oceans Day, it will recognize the Southern Ocean as the world's fifth ocean.

"The Southern Ocean has long been recognized by scientists, but because there was never agreement internationally, we never officially recognized it," says National Geographic Society Geographer Alex Tait.

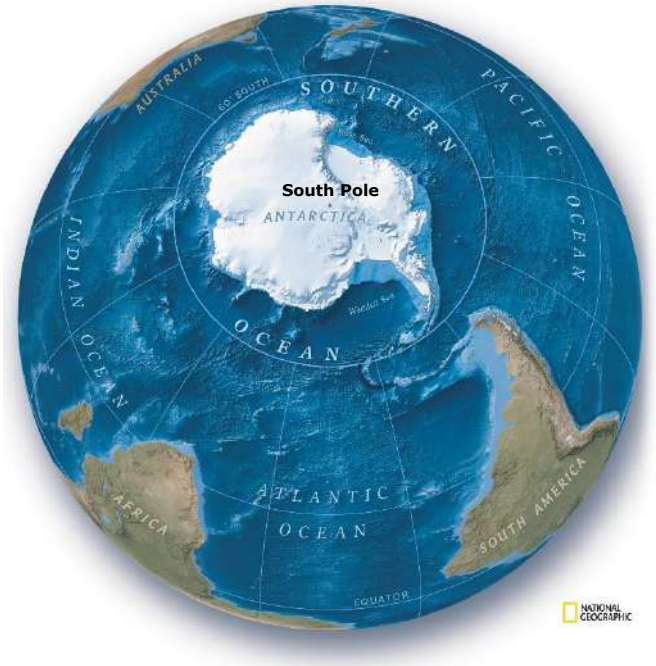
Geographers debated whether the waters around Antarctica had enough unique characteristics to deserve their own name, or whether they were simply cold, southern extensions of the Pacific, Atlantic, and Indian Oceans.

"It's sort of geographic nerdiness in some ways," Tait says. He and the National Geographic Society's map policy committee had been considering the change for years, watching as scientists and the press increasingly used the term Southern Ocean.

The change, he adds, aligns with the Society's initiative to conserve the world's oceans, focusing public awareness onto a region in particular need of a conservation spotlight.

"We've always labeled it, but we labeled it slightly differently [than other oceans]," Tait says. "This change was taking the last step and saying we want to recognize it because of its ecological separation."

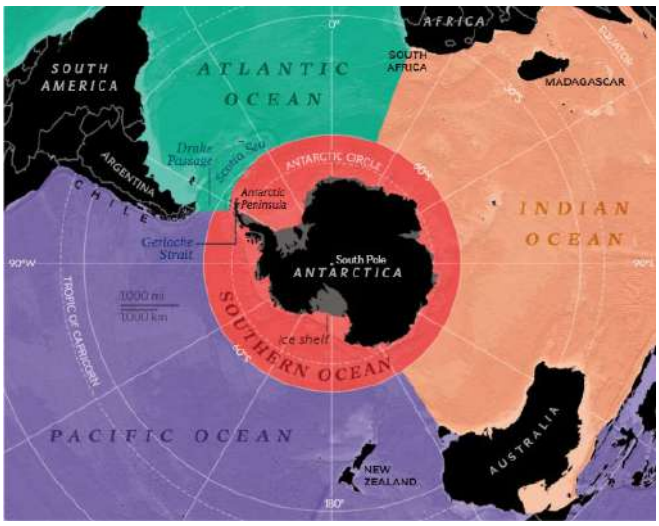
Marine biologist and National Geographic Explorer at Large Sylvia Earle praised the cartographic update.



"While there is but one interconnected ocean, bravo to National Geographic for officially recognizing the body of water surrounding Antarctica as the Southern Ocean," Earle wrote in an e-mailed statement. "Rimmed by the formidably swift Antarctic Circumpolar Current, it is the only ocean to touch three others and to completely embrace a continent rather than being embraced by them."

Limits of the Southern Ocean

National Geographic now recognizes five world oceans. Most of the waters that surround Antarctica out to 60 degrees south latitude, excluding the Drake Passage and Scotia Sea, constitute the newly acknowledged Southern Ocean.



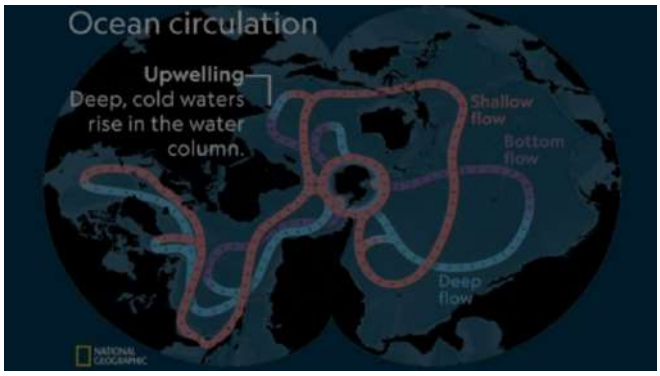
An ocean defined by its current

While the other oceans are defined by the continents that fence them in, the Southern Ocean is defined by a current.

Scientists estimate that the Antarctic Circumpolar Current

(ACC) was established roughly 34 million years ago, when Antarctica separated from South America. That allowed for the unimpeded flow of water around the bottom of the Earth.

The ACC flows from west to east around Antarctica, in a broad fluctuating band roughly centered around a latitude of 60 degrees south—the line that is now defined as the northern boundary of the Southern Ocean. Inside the ACC, the waters are colder and slightly less salty than ocean waters to the north.



Ocean circulation defines the Southern Ocean.

Extending from the surface to the ocean floor, the ACC transports more water than any other ocean current. It pulls in waters from the Atlantic, Pacific, and Indian Oceans, helping drive a global circulation system known as the conveyor belt, which transports heat around the planet. Cold, dense water that sinks to the ocean floor off Antarctica also helps store carbon in the deep ocean. In both those ways, the Southern Ocean has a crucial impact on Earth's climate.

Scientists are currently studying how human-driven climate change is altering the Southern Ocean. Ocean water moving through the ACC is warming, scientists have learned, but it's unclear how much this is impacting Antarctica. Some of the most rapid melting of the continents ice sheets and shelves have been where the ACC is closest to land.

An environment like no other

For now, by fencing in the frigid southern waters, the ACC helps keep Antarctica cold and the Southern Ocean ecologically distinct. Thousands of species live there and nowhere else.

The Southern Ocean "encompasses unique and fragile marine ecosystems that are home to wonderful marine life such as whales, penguins, and seals," notes National Geographic Explorer in Residence Enric Sala.

What's more, the Southern Ocean has ecological effects elsewhere as well. Humpback whales, for example, feed on krill off Antarctica and migrate far north to winter in very different ecosystems off South and Central America. Some seabirds migrate in and out too.

By drawing attention to the Southern Ocean, the National Geographic Society hopes to promote its conservation.

The impacts of industrial fishing on species like krill and Patagonian toothfish (which is marketed as Chilean sea bass) has been a concern in the Southern Ocean for decades. In 1982, catch limits were imposed in the region. The largest marine protected area (MPA) in the world was established in the Ross Sea off West Antarctica in 2016. A number of organizations are working to set aside more MPAs to protect the Southern Ocean's most critical feeding grounds, for example off the Antarctic Peninsula.

"Many nations across the world support the protection of some of these areas from industrial fishing," Sala says.

Mapping the world as it is

Since the late 1970s, the National Geographic Society has employed a geographer who oversees changes and tweaks to every map that's published. Tait has been on the job since 2016.

He says he takes a journalist's approach to the process. It involves staying on top of current events and monitoring who controls what areas of the world.

"It is important to note it's a map policy, not a policy about Nat Geo's position on [geopolitical] disputes," he says. For example, National Geographic maps show that the U.K. controls the Falkland Islands, even though Argentina claims them too. In disputed areas, Tait works with a team of geographers and editors to determine what most accurately represents a given region.

Minor changes happen on a weekly or biweekly basis. Major changes, like labeling the Southern Ocean, are more rare.

Generally, National Geographic has followed the International Hydrographic Organization (IHO) on marine names. While not directly responsible for determining them, the IHO works with the United Nations Group of Experts on Geographical Names to standardize names on an international scale. The IHO recognized the Southern Ocean in its 1937 guidelines but repealed that designation in 1953, citing controversy. It has deliberated on the matter since, but has yet to receive full agreement from its members to reinstate the Southern Ocean.

The U.S. Board on Geographic Names, however, has used the name since 1999. And in February of this year, NOAA officially recognized the Southern Ocean as distinct.

Tait says National Geographic's new policy will have an impact on how children using maps in school learn to see the world.

"I think one of the biggest impacts is through education," he says. "Students learn information about the ocean world through what oceans you're studying. If you don't include the Southern Ocean then you don't learn the specifics of it and how important it is."

(Sarah Gibbens / National Geographic, June 8, 2021, https://www.nationalgeographic.com/environment/article/theres-a-new-ocean-now-can-you-name-all-five-southern-ocean)

Review article: Risk management framework of environmental hazards and extremes in Mediterranean ecosystems

Panagiotis T. Nastos, Nicolas R. Dalezios, Ioannis N. Faraslis, Kostas Mitrakopoulos, Anna Blanta, Marios Spiliotopoulos, Stavros Sakellariou, Pantelis Sidiropoulos, and Ana M. Tarquis

Abstract

Risk assessment constitutes the first part within the risk management framework and involves evaluating the importance of a risk, either quantitatively or qualitatively. Risk

assessment consists of three steps, namely risk identification, risk estimation and risk evaluation. Nevertheless, the risk management framework also includes a fourth step, i.e., the need for feedback on all the risk assessment undertakings. However, there is a lack of such feedback, which constitutes a serious deficiency in the reduction of environmental hazards at the present time. Risk identification of local or regional hazards involves hazard quantification, event monitoring including early warning systems and statistical inference. Risk identification also involves the development of a database where historical hazard information and hazard effects are included. Similarly, risk estimation involves magnitude–frequency relationships and hazard economic costs. Furthermore, risk evaluation consists of the social consequences of the derived risk and involves cost-benefit analysis and community policy. The objective of this review paper is twofold. On the one hand, it is to address meteorological hazards and extremes within the risk management framework. Analysis results and case studies over Mediterranean ecosystems with emphasis on the wider area of Greece, in the eastern Mediterranean, are presented for each of the three steps of risk assessment for several environmental hazards. The results indicate that the risk management framework constitutes an integrated approach for environmental planning and decision-making. On the other hand, it sheds light on advances and current trends in the considered meteorological and environmental hazards and extreme events, such as tornadoes, waterspouts, hailstorms, heat waves, droughts, floods, heavy convective precipitation, landslides and wildfires, using recorded datasets, model simulations and innovative methodologies.

1 Introduction

Disaster risk arises when hazards interact with physical, social, economic and environmental vulnerabilities. The impact of disaster can be transferred from one region to another. This, compounded by increasing vulnerability related to several factors, such as population growth, land pressure, urbanization, social inequality, climate change, political change, economic growth, technological innovation, social expectations, global interdependence, environmental degradation, competition for scarce resources and the impact of epidemics, points to a future where disasters could increasingly threaten, among others, the sustainable development of agricultural regions (Smith, 2013). Sustainable development, socioeconomic improvement, good governance and disaster risk reduction are mutually supportive objectives.

Environmental degradation is one of the major factors contributing to the *vulnerability* of environment and agriculture because it directly magnifies the risk of natural disasters (Dalezios et al., 2017). In order to ensure *sustainability* in environmental status and agricultural production, a better understanding of the natural disasters that have an impact on the environment and agriculture is essential (Sivakumar et al., 2005). A comprehensive assessment of impacts of natural disasters on environment and agriculture requires a multidisciplinary, multi-sectoral and integral approach involving several components and factors (Dalezios et al., 2020). Priority should be given to supporting applied research since research is necessary to understand the physical and biological factors contributing to disasters. Community-wide awareness and capacity building programs on natural disasters, mainly for farmers and stakeholders, should also be included in any research effort. Programs for improving prediction and early warning methods, as well as dissemination of warnings, should be expanded and intensified. Moreover, efforts are required to determine the impact of disasters on natural resources.

Recent research findings suggest that variability of climate, if encompassing more intense and frequent extremes, such as major large-scale environmental hazards like droughts, heat waves (HWs) or floods, results in the occurrence of natural disasters that are beyond our socioeconomic planning levels. This is expected to stretch regional response capabilities beyond their capacity and will require new adaptation and preparedness strategies (Salinger et al., 2005). Disaster prevention and preparedness should become a priority, and rapid response capacities to climate change need to be accompanied by a strategy for disaster prevention. Nevertheless, each type of extreme event has its own specific climate, cultural and environmental setting, and mitigation activities must use these settings as a foundation of proactive management. There is an urgent need to assess the forecasting skills for natural disasters affecting mainly agriculture and other sectors of the economy in order to determine those where more research is necessary. It is well known that the lack of good forecast skill is a constraint to improving adaptation, management and mitigation. Seasonal to interannual climate forecasting is a new branch of climate science which promises to reduce vulnerability. Improved seasonal forecasts are now being linked to decision-making for cropping. The application of climate knowledge to the improvement of risk management is expected to increase the resilience of farming systems.

A more integrated approach to environmental hazards has been gradually attempted using common methodologies, such as risk analysis. An understanding of extreme events and disasters is a prerequisite for the development of adaptation strategies in the context of climate change and risk reduction within the disaster risk management framework (IPCC, 2012). Extreme events will have greater impacts on sectors with closer links to climate, such as agriculture and food security (Dalezios et al., 2020). Risk management means reducing the threats posed by known hazards while at the same time accepting unmanageable risks and maximizing any related benefits (Smith, 2013). Moreover, risk assessment constitutes the first part within the risk management framework and involves evaluating the importance of a risk, either quantitatively or qualitatively. Risk assessment consists of three steps (Smith, 2013), namely risk identification, risk estimation and risk evaluation. Nevertheless, the risk management framework also includes a fourth step, i.e., the need for feedback on all the risk assessment undertakings. However, there is a lack of such feedback, which constitutes a serious deficiency in the reduction of environmental hazards at the present time.

The objective of this paper is to attempt a comprehensive presentation of the risk management framework related to environmental hazards and, specifically, to meteorological hazards and extremes. At first, a comprehensive description of the risk management framework is presented. This is followed by a description of the concepts of meteorological hazards. Then, environmental hazards and extremes are analyzed, and several case studies are presented with emphasis on the wider area of Greece, eastern Mediterranean.

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How to cite.

Nastos, P. T., Dalezios, N. R., Faraslis, I. N., Mitrakopoulos, K., Blanta, A., Spiliotopoulos, M., Sakellariou, S., Sidiropoulos, P., and Tarquis, A. M.: Review article: Risk management framework of environmental hazards and extremes in Mediterranean ecosystems, Nat. Hazards Earth Syst. Sci., 21, 1935–1954, https://doi.org/10.5194/nhess-21-1935-2021, 2021.

https://nhess.copernicus.org/articles/21/1935/2021/

Crushed waste glass to create a more sustainable shotcrete?

Engineers at the University of Queensland (UQ), Australia are working on a project that envisages the use of crushed wine bottles and other recycled glass as replacements for sand in shotcrete.

Aiming to cut construction costs and make shotcrete more sustainable, the industry-sponsored project – now in its second phase – comes at a time when a global shortage of sand is expected. Dr Mehdi Serati of UQ's School of Civil Engineering said that innovation of this nature was critical given the finite amount of sand available globally.

"If we don't do something about sand depletion at a global scale, our grandchildren are not going to see sandy beaches. Over the past 20 years, the cost of sand has increased by six times, and it's the second most consumed natural product globally, after fresh water," Serati said.

He explained that crushed waste glass (CWG) had numerous benefits when used as a replacement for sand in shotcrete. As a waste material from another sector, it would be more sustainable, but also cheaper than sand, and would require less water, given glass has zero water absorption.

After 12 months of testing, results are said to be positive. The project will now look at managing the mix proportions to optimise shotcrete for CWG rather than for sand.

Niki Jackson from GCP Applied Technologies said: "The results so far show that using CWG as a replacement for natural sand is a viable option as the concrete was able to meet and sometimes exceed the results from the base mix."

Although the project has so far shown promising results, further study is required, particularly to ascertain the fire performance of CWG shotcrete for tunnels and civil works.

(Tunnels and Tunnelling, 1 June 2021, http://www.tunnelsonline.info/news/crushed-waste-glass-to-create-a-more-sustainable-shotcrete-8781536/)

ΕΝΔΙΑΦΕΡΟΝΤΑ - ΛΟΙΠΑ

Το Πείραμα του Cern - Πολυσύμπαν (Multiverse) και LHC

Με την ευκαιρία της διάλεξης του Δρ. Γιάννη Μπαζιώτη «Μετεωρίτες: η σημασία τους για τη κοινωνία και η αναζήτηση τους στην Ανταρκτική», θυμηθήκαμε την διάλεξη του Καθηγητού Δημήτρη Νανόπουλου, Διακεκριμένου Καθηγητή Φυσικής, Πανεπιστήμιο Texas A&M (ΗΠΑ), Τακτικού Μέλους της Ακαδημίας Αθηνών, σχετικά με το πείραμα του CERN και την έρευνα για την δημιουργία του σύμπαντος και για τα θεμελιώδη φαινόμενα της Φυσικής.

Το πείραμα του CERN προετοιμάστηκε για περισσότερο από μία δεκαετία, ενώ για την πραγματοποίησή του απαιτήθηκαν αρκετά δισεκατομμύρια ευρώ. Τι και με ποιον τρόπο μπορεί να μας αποκαλύψει ο Μεγάλος Επιταχυντής Αδρονίων για τη δημιουργία του σύμπαντος και για τα θεμελιώδη φαινόμενα της Φυσικής;

Κεντρικό θέμα αυτής της ομιλίας ήταν η πιθανή πειραματική διερεύνηση του Πολυσύμπαντος χρησιμοποιώντας τον Μεγάλο Αδρονικό Επιταχυντή (LHC) του CERN. Ο Δημήτρης Νανόπουλος παρουσίασε μερικές νέες ιδέες που ανέπτυξε με την ομάδα του στο Πανεπιστήμιο του Texas A&M, οι οποίες δίνουν μια πολύ συγκεκριμένη μορφή στην έννοια του Πολυσύμπαντος, δηλαδή της ύπαρξης ίσως και πιο πολλών από 10^{500} Σύμπαντα, όπως είναι γνωστό από τη θεωρία των Υπερχορδών.

Μια εντελώς νέα ματιά στη φυσική και στο Πολυσύμπαν αναδύεται και το LHC μπορεί να αποτελέσει έναν αναντικατάστατο κρίκο.

Δημήτρης Νανόπουλος: Πολυ-Σύμπαν αποσπάσματα από 1 έως 7 https://www.youtube.com/watch?v=R2IEgMpaEw4

Η διάλεξη παρουσιάστηκε στην Στέγη Γραμμάτων και Τεχνών του Ιδρύματος Ωνάση την 9η Μαρτίου 2011 και μπορείτε να την παρακολουθήσετε στα

1/7: https://www.youtube.com/watch?v=PrgiE...
2/7: https://www.youtube.com/watch?v=1a_50...
3/7: https://www.youtube.com/watch?v=ihXuu...
4/7: https://www.youtube.com/watch?v=SlCE2...
5/7: https://www.youtube.com/watch?v=S1R6q...
6/7: https://www.youtube.com/watch?v=ezZ6h...
7/7: https://www.youtube.com/watch?v=hMI_M...

και περίληψη στο
https://www.youtube.com/watch?v=R2IEgMpaEw4

Στη συνέχεια παρατίθεται κείμενο παρουσίασης της διάλεξης.

Πολύ-Σύμπαν

Δημήτρης Νανόπουλος

Δεν υπάρχει μόνο ένα, αλλά πάρα πολλά σύμπαντα –συγκεκριμένα δέκα εις την πεντακοσιοστή και δεν αποκλείεται στο μέλλον να δημιουργούμε σύμπαντα στο εργαστήριο, ενώ δεν αντιλαμβανόμαστε ότι πιθανότατα ζούμε σε δέκα διαστάσεις. Αυτές είναι μερικές νέες επιστημονικές ιδέες που ανέπτυξε πρόσφατα με την ερευνητική του ομάδα ο Δημήτρης Νανόπουλος, διακεκριμένος καθηγητής Φυσικής του πανεπιστημίου του Τέξας A&M και τακτικό μέλος της Ακαδημίας Αθηνών, που μίλησε χθες στη Στέγη Γραμμάτων και Τεχνών σχετικά με το πείραμα του CERN και την πειραματική διερεύνηση της ύπαρξης του Πολυσύμπαντος (multiverse).

Ειδικότερα, όπως αναφέρει ρεπορτάζ του Αθηναϊκού Πρακτορείου Ειδήσεων, ο κ. Νανόπουλος εκτιμά, με βάση μαθηματικές εξισώσεις, ότι **είναι δυνατό να υπάρχουν δέκα εις την πεντακοσιοστή σύμπαντα**, σύμφωνα με τη θεωρία της Υπερσυμμετρίας (SUSY) και των Υπερχορδών, η οποία προβλέπει ότι, εκτός από τις γνωστές τέσσερις «μεγάλες» διαστάσεις -τρεις του χώρου (μήκος, πλάτος, ύψος) και ο χρόνος- υπάρχουν ακόμα έξι ή επτά, που βρίσκονται «διπλωμένες» σε τρομερά μικρό χώρο, ανεβάζοντας σε 10 ή 11 τον συνολικό αριθμό των διαστάσεων. «Ζούμε σε δέκα διαστάσεις, αλλά δεν το αντιλαμβανόμαστε», είπε χαρακτηριστικά.

Η θεωρία του πολυσύμπαντος ή των πολλών παράλληλων συμπάντων έχει διάφορες εκδοχές, μια από τις οποίες προωθεί σθεναρά ο κ. Νανόπουλος, ο οποίος τόνισε όμως ότι μια τέτοια θεωρία έχει νόημα μόνο αν καταστεί δυνατό να αποδειχτεί πειραματικά και σε αυτό μπορεί να βοηθήσει ο Μεγάλος Επιταχυντής Αδρονίων του Ευρωπαϊκού Οργανισμού Πυρηνικών Ερευνών (CERN).

Όπως υποστηρίζει ο Έλληνας φυσικός, κάθε επιμέρους σύμπαν (μεταξύ αυτών και το δικό μας) μέσα σε αυτό το πολυσύμπαν μπορεί να έχει τους δικούς του ξεχωριστούς φυσικούς νόμους, που ισχύουν μόνο σε αυτό, ενώ στα άλλα σύμπαντα οι νόμοι που τα διέπουν, μπορεί να είναι αφάνταστα διαφορετικοί ή και σχετικά παρόμοιοι, έχουν όμως οπωσδήποτε ως κοινό παρονομαστή τη βαρύτητα. **Το ένα σύμπαν «γεννάει» το άλλο, μέσα σε μια αέναη διαδικασία παραγωγής συμπάντων**, η οποία, όπως είπε, καταργεί την έννοια της αρχής και του τέλους του χρόνου.

Τα άλλα σύμπαντα, τα οποία χαρακτήρισε «φυσαλίδες της πραγματικότητας» που απαρτίζουν το πολυ-σύμπαν, είναι δυνατό να βρίσκονται πολύ κοντά μεταξύ τους αλλά δεν μπορούν να επικοινωνήσουν. Δεν απέκλεισε όμως ότι είναι πιθανώς δυνατό να γίνει μετάβαση από το ένα σύμπαν στο άλλο. **Όλα τα σύμπαντα με τους ιδιαίτερους νόμους τους προκύπτουν κατά βάση από μόνα τους**, σαν μια «τοπική μετάλλαξη» του χώρου σε ένα προϋπάρχον σύμπαν. Ο κ. Νανόπουλος δεν απέκλεισε μάλιστα ως σενάρια επιστημονικής φαντασίας τολμηρές υποθέσεις ότι κάποια σύμπαντα θα μπορούσαν π.χ. να αποτελούν δημιούργημα ενός «χάκερ» σε κάποιο άλλο σύμπαν. Επεσήμανε ότι, αν τελικά αποδειχτεί η θεωρία του πολυ-σύμπαντος, τότε «θα καταλαβαίνουμε τον μηχανισμό παραγωγής συμπάντων», οπότε, όσο κι αν ακούγεται εξωφρενικό, «είναι πιθανό στο μέλλον να δημιουργηθεί ένα σύμπαν στο εργαστήριο».

Ακόμα, ανέφερε ότι **δεν αποκλείεται το σύμπαν που ζούμε τώρα, να δημιουργηθεί ξανά ακριβώς το ίδιο στο μέλλον**, ενώ το τωρινό σύμπαν μας θα μπορούσε να είναι το νιοστό από το παρελθόν, να έχει δηλαδή ήδη προϋπάρξει πολλές φορές. Ωστόσο, κατέστησε σαφές ότι είναι νωρίς ακόμα για να επιβεβαιωθούν τέτοιες υποθέσεις, πρόσθεσε όμως ότι τελικά αποτελούν λογικές συνέπειες της ευρύτερης θεωρίας του πολυ-σύμπαντος, που θα έπρεπε κανείς να ακολουθήσει και να διερευνήσει.

Σύμφωνα με τον ίδιο, **το σύμπαν που βλέπουμε (της ορατής ύλης) και το οποίο έχει ηλικία 13,7 δισεκατομμυρίων ετών, δεν είναι παρά το 4%, καθώς το υπόλοιπο είναι αόρατο, αποτελούμενο κατά 23% από «σκοτεινή ύλη» και 73% από «σκοτεινή ενέργεια»**. Ο κ. Νανόπουλος είπε ακόμα ότι ο ήλιος κάποτε θα «σβήσει», όμως το σύμπαν μας, που συνεχώς διαστέλλεται, είναι «ανοιχτό», συνεπώς ποτέ δεν θα «πεθάνει», ενώ είναι πιθανό να κάνει «μετάβαση» σε ένα άλλο σύμπαν-φυσαλίδα.

Επιτιθέμενος στους υπέρμαχους της «ανθρωπικής Αρχής» (που λένε ότι το σύμπαν είναι "κομμένο και ραμμένο" στα μέτρα των ανθρώπων), αντέτεινε ότι **«δεν του καίγεται καρφάκι του σύμπαντος για εμάς»**, ενώ χαρακτήρισε τη θεωρία του πολυ-σύμπαντος «το τελευταίο καρφί στο φέρετρο της τελεολογίας». Απαντώντας σε σχετική ερώτηση, διευκρί-

νισε ότι δεν έχει χάσει το νόημά της η αναζήτηση μιας «ενοποιημένης θεωρίας του παντός» στην Φυσική, όμως δεν θα αφορά παρά μια λύση μοναδική για το δικό μας σύμπαν και τίποτε περισσότερο.

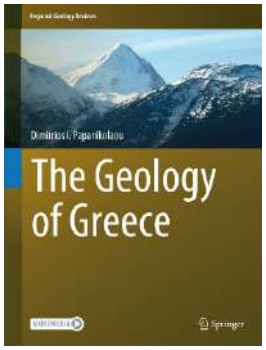
Απαντώντας σχετικά με τις φιλοσοφικές προεκτάσεις της θεωρίας του πολυ-σύμπαντος, είπε ότι **παραπέμπει σε «ένα νέο Διαφωτισμό»** που ανοίγει νέους δρόμους για την ανθρωπότητα, ενώ αρνήθηκε ότι υπάρχουν φραγμοί και όρια στις δυνατότητες του ανθρώπινου νου να συλλάβει την πραγματικότητα του σύμπαντος, εκτός από τα αναπόφευκτα ποσοτικά όρια στη συσσώρευση γνώσης στο μυαλό του ανθρώπου. Όμως γι' αυτό, όπως είπε, υπάρχουν οι ηλεκτρονικοί υπολογιστές ως συμπαραστάτες μας, ενώ στο μέλλον η σχέση τους με τους ανθρώπους θα μπορούσε να γίνει ακόμα πιο στενή. Αρνήθηκε επίσης ότι συσσωρεύοντας ολοένα περισσότερες γνώσεις, οι άνθρωποι χάνουν τη σοφία τους. Παράλληλα, συμφώνησε με τις εκτιμήσεις άλλων επιστημόνων ότι η Γη αργά ή γρήγορα «δύσκολα θα αντέξει» στα προβλήματά της, γι' αυτό είναι ανάγκη να προετοιμαστεί η μετοίκηση της ανθρωπότητας σε άλλους πλανήτες.

Όσον αφορά στον CERN, δήλωσε ότι πλέον «δουλεύει ρολόι», αν και οι φυσικοί που αναλύουν τις συγκρούσεις των σωματιδίων, είναι αναγκασμένοι «να ψάχνουν ψύλλους στα άχυρα». Πάντως, σε προηγούμενη ομιλία του στην Αθήνα, είχε δηλώσει ότι αν τελικά τα πειράματα του CERN δεν φέρουν τα αναμενόμενα αποτελέσματα, αποτυγχάνοντας να βρουν νέα σωματίδια και να επιβεβαιώσουν πειραματικά την υπερσυμμετρία, τότε «αυτό θα αποτελέσει ένα πολύ μεγάλο πρόβλημα για τη Φυσική, θα προκαλέσει μια μεγάλη κρίση», καθώς θα σημαίνει, όπως είχε πει χαρακτηριστικά, ότι «πήραμε λάθος δρόμο».

Τέλος, αναφερόμενος σε πρόσφατο δημοσίευμα του περιοδικού «Nature», που θεωρεί πιθανή την κατάρρευση της θεωρίας της υπερσυμμετρίας, επειδή τα μέχρι τώρα αποτελέσματα των πειραμάτων του CERN δεν την επιβεβαιώνουν, ο έλληνας φυσικός χαρακτήρισε υπερβολική και πρόωρη μια τέτοια εκτίμηση.

(tvxs, 10 Μαρ. 2011, https://tvxs.gr/news/sci-tech/δ-νανόπουλος-«ζούμε-σε-δέκα-διαστάσεις-αλλά-δεν-το-αντιλαμβανόμαστε»)

ΝΕΕΣ ΕΚΔΟΣΕΙΣ ΣΤΙΣ ΓΕΩΤΕΧΝΙΚΕΣ ΕΠΙΣΤΗΜΕΣ



The Geology of Greece

Dimitrios I. Papanikolaou

This book introduces the reader to the unique geology of Greece. This country is a natural geology laboratory that can help us understand the present-day active geodynamic processes in the Hellenic orogenic arc, including earthquakes, volcanoes, coastline changes and other processes of uplift and subsidence, as well as the intense erosion, transport and deposition of sediments. Additionally, Greece offers a remarkable geological museum, reflecting the complex history of the area over the last 300 million years. By studying the rocks of Greece, one can discover old oceanic basins, e.g. in the Northern Pindos and Othrys mountains, crystalline rocks of Palaeozoic age, old granitic and volcanic rocks, as well as other sedimentary rocks including fossils from the shallow neritic facies to pelagic and abyssal facies. The younger sediments demonstrate the continuously changing palaeogeography of Greece, with areas of lakes, high plateaus and gulfs that are transformed into new forms of islands, peninsulas or high mountains, etc. All the above subjects are included in the book, which describes the tectonic structure of the geological strata, together with the evolutionary stages of the palaeogeography and geodynamics within the broader Mediterranean context. A special characteristic of the book is the development of the orogenic model of the Hellenides with the application of the tectono-stratigraphic terrane concept in the Tethyan system.

(Springer, Cham, 2021)

ΗΛΕΚΤΡΟΝΙΚΑ ΠΕΡΙΟΔΙΚΑ

www.issmge.org/publications/issmge-bulletin/vol-15-issue-3-june-2021

Κυκλοφόρησε το Τεύχος #3 του Τόμου 15 (Ιουνίου 2021) του Bulletin της ISSMGE με τα ακόλουθα περιεχόμενα:

ISSMGE Time Capsule Project

Message from the member society

- R&D collaboration forum on "Slope De-sign in Hong Kong" by the Hong Kong Geotechnical Society

Conference reports

- 1st International Symposium on Construction Resources for Environmentally Sustainable Technologies (CREST)
- The HKIE Geotechnical Division 41st Annual Seminar
- Geotechnical Challenges in Freezing Soil
- 2nd all-Russian Conference

Hot news

Obituary

Event Diary

Corporate Associates

Foundation Donors

International Journal of Geoengineering Case Histories

An official journal of the International Society for Soil Mechanics and Geotechnical Engineering

Volume 6, Issue #2, https://www.geocasehistoriesjournal.org/pub/issue/view/48

Κυκλοφόρησε το Τεύχος #2 του Τόμου 6 του International Journal of Geoengineering Case Histories με τα ακόλουθα περιεχόμενα:

Settlement of shallow foundations on sand – a database study, Mostafa Bahmani Shoorijeh, Jean-Louis Briaud

Field Test of Temporary Excavation Wall Support in Sensitive Clay, Miah Alam, Omar Chaallal, Bertrand Galy

www.isrm.net/adm/newsletter/ver_html.php?id_newsletter=209

Κυκλοφόρησε το τεύχος Αρ. 54, Ιουνίου 2021 του Newsletter της ISRM με τα ακόλουθα περιεχόμενα:

- Message from the President
- ISRM International Symposium Eurock 2021 programme
- 34th ISRM online lecture by Prof. Doug Stead
- Three nominations were received for ISRM President 2023-2027
- Three candidates to the organization of the 16th ISRM International Congress in 2027
- ISRM International Symposium LARMS 2022
- ARMS11, Beijing, China, 21-25 October 2021, the 2021 ISRM Asian Regional Symposium
- Eurock 2022, Helsinki, Finland, 12-15 September 2022 - call for papers
- New ISRM course on Monitoring Data Interpretation by Prof. Wulf Schubert
- New ISRM course on Rock Mass Characterization and Monitoring based on Advanced Remote Sensing Techniques
- ISRM Suggested Method video
- ISRM Rocha Medal 2023 - nominations to be received by 31 December 2021
- ISRM Sponsored Conferences

ITAym - International Tunnelling Association young members

Newsletter ITAym

June 2021 Issue of Young Members Group Newsletter

08 June 2021

MG is pleased to announce that the June 2021 edition of its newsletter is out.

Click on the link below to read the issue.

https://mailchi.mp/88c2542359bf/itaym-8155490?e=b4e29082f2

ITACET Foundation
Foundation for Education and Training on Tunnelling and Underground Space Use
Newsletter #33
June 2021

www.itacet.org/newsletter-33-june-2021

Κυκλοφόρησε το Τεύχος #33, Ιουνίου 2021 του ITACET Foundation με τα ακόλουθα περιεχόμενα:

- **President's address**
- **Editorial: The Lunchtime Lecture Series**
- **Training session reports**

  Calculation methods in tunnel design, date: 27/04/2021 to 06/05/2021
  Lunchtime lecture series - #5, date: 08/06/2021
  Lunchtime lecture series - #4, date: 11/05/2021
  Lunchtime lecture series - #3, date: 13/04/2021
  Lunchtime lecture series - #2, date: 09/03/2021
  Lunchtime lecture series - #1, date: 09/02/2021
- **Forthcoming sessions**

  Lunchtime lecture series - #6, date: 13/07/2021M
  Maitrise de l'excavation et instabilités en méthode conventionnelle, date: 05/09/2021
- **Other events in preparation**

  The following training programmes are under preparation:

  India: **Storm water drainage management**
  India: **Advances in tunnel construction**
  Brazil: **Tunnelling 4.0**
  Chile: **Mechanized tunnelling and shafts**
- **Other news**

  Update On The Lunchtime Lecture Series
  A New Project For The Foundation - The Online Lunchtime Lecture Series!

International Geosynthetics Society

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

IGS NEWSLETTER – June 2021

Helping the world understand the appropriate value and use of geosynthetics

httpwww.geosyntheticssociety.org/newsletters

- New Dates for EuroGeo7 READ MORE
- Did You Know...? READ MORE
- Changes at Geosynthetics International READ MORE
- IGS University Lecture Series Launch READ MORE
- First EtE Program Hosted by Chinese Taipei Chapter in 2020 READ MORE
- Sustainability eBook Now In Italian! READ MORE
- Chinese Chapter Elects New Officials READ MORE
- IGS Young Members: Down To Earth – An Interview With Lucía Isabel Dávila READ MORE
- Spanish Mining Webinar Success READ MORE
- Upcoming Webinars
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  Establishing Uncertainty of Geosynthetic Test Methods REGISTRATION INFORMATION
  Geosynthetics in Roadway Applications Webinar REGISTRATION INFORMATION
- Calendar of Events

www.icevirtuallibrary.com/toc/jgein/28/3

Κυκλοφόρησε το Τεύχος 3 του Τόμου 28 (Ιουνίου 2021) του Geosynthetics International της International Geosynthetics Society με τα ακόλουθα περιεχόμενα:

Shaking table study on sand-EPS beads-mixtures using a laminar box, R. Alaie, R. Jamshidi Chenari, M. Karimpour-Fard, 28(3), pp. 224–237

Interaction mechanisms in small-scale model MSE walls under the strip footing load, H. Ahmadi, A. Bezuijen, J.G. Zornberg, 28(3), pp. 238–258

Monotonic, cyclic and post-cyclic shearing behavior of sand-EPS geofoam interface, T. H. Basti, R. J. Chenari, M. Payan, K. Senetakis, 28(3), pp. 259–278

Use of geosynthetics to mitigate problems associated with expansive clay subgrades, J. G. Zornberg, G. H. Roodi, 28(3), pp. 279–302

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Liquefaction behavior of fiber-reinforced sand based on cyclic triaxial tests, J. Zhang, Z. Yang, Q. Yang, G. Yang, G. Li, J. Liu, 28(3), pp. 316–326

Influence of pocket shape on numerical response of geocell reinforced foundation systems, R. Gedela, R. Karpurapu, 28(3), pp. 327–337

www.sciencedirect.com/journal/geotextiles-and-geomembranes/vol/49/issue/3

Κυκλοφόρησε το Τεύχος 3 του Τόμου 49 (Ιουνίου 2021) του Geotextiles and Geomembrabes της International Geosynthetics Society με τα ακόλουθα περιεχόμενα:

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