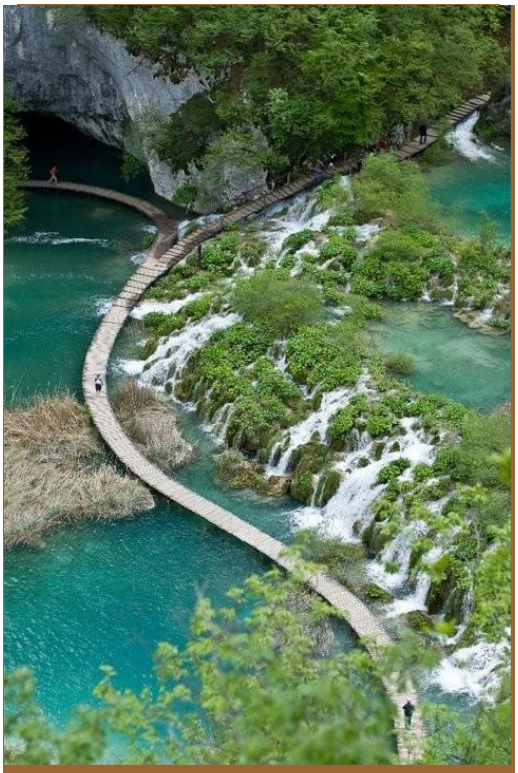


ΕΛΛΗΝΙΚΗ ΕΠΙΣΤΗΜΟΝΙΚΗ ΕΤΑΙΡΕΙΑ ΕΔΑΦΟΜΗΧΑΝΙΚΗΣ & ΓΕΩΤΕΧΝΙΚΗΣ ΜΗΧΑΝΙΚΗΣ

Τα Νέα της Ε Ε Ε Ε Γ Μ

120

Αρ. 120 – ΝΟΕΜΒΡΙΟΣ 2018

Skills shortages and the leaky engineering pipeline

Why are over 2,000 engineering graduates out of work or in jobs that don't need degrees asks Charlie Ball, Prospects' Head of Higher Education Intelligence?

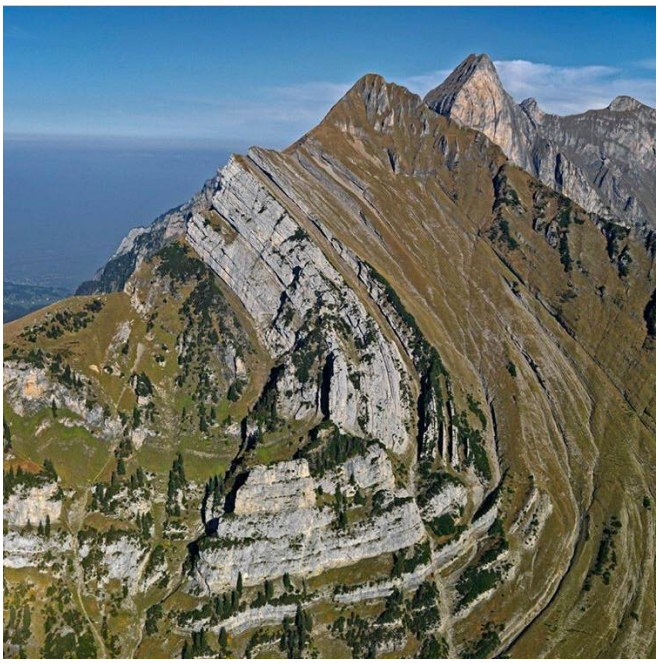
This year's issue of Prospects' 'What do graduates do?' analyses data from the HESA Destination of Leavers of Higher Education survey to chart what happened to last year's graduates six months after leaving university. The engineering data shows a familiar situation – a tale of high employment of subjects in considerable demand, but with pockets of underemployment. What is going on when employers are crying out for engineers?

Last year, 16,025 engineering first degrees were awarded (this includes 4 year MEngs as well as 3 year BEngs – 37% of these degrees were 4 year awards). We know what happened to 12,880 of them. Around 75% (9,675) went into work (some combined work with study) and 65.5% (6,340) were working as engineers or technicians. So, straight away, a third of working engineering graduates were not working as engineers.

It's a common assumption that engineers are moving to the finance industry. While that does happen, it's not especially widespread – around 10% of those working at

(συνέχεια στην σελίδα 3)

Π Ε Ρ Ι Ε Χ Ο Μ Ε Ν Α



Sichelkamm mountable in Switzerland. The huge fold (syncline) in the flank of the mountain is an impressive witness of the collision between Africa and Europe (από Γιάννη Μεταξά).

(συνέχεια από την πρώτη σελίδα)

most. More concerning is that nearly 1,300 engineering graduates worked in roles that didn't require a degree. And engineering graduates entered a huge range of other roles too.

Another 1,810 graduates took another degree – this group were largely 3 year engineering graduates taking a Masters in engineering (mechanical, civil and chemical the most popular specialisms) with about a quarter taking a PhD. A small number take Masters in finance and business, but again whilst a consistent leak in the pipeline, it is not a mass movement.

A further 6.7% of graduates were unemployed, although about one in six had a future job lined up.

Why are over 2,000 engineering graduates out of work or in jobs that don't need degrees?

Nearly a quarter of last year's unemployed engineering graduates had a First

The simple answer could be that many engineering graduates don't have the skills for the jobs market and so are not attractive to employers. There's no question that not every graduate, even in a high demand field like engineering, is going to be equipped with the skills or mindset employers want right away. But nearly 40% of unemployed engineers had those coveted MEngs. The majority had a 2:1 or above. Nearly a quarter of last year's unemployed engineering graduates had a First. They can't *all* be unemployable.

So what else is there? Unfortunately nearly 45% of all unemployed engineering graduates were from a BME background. Engineering is one of the more diverse degrees – 27% of graduates were BME last year. This would be a real feather in the industry's cap if it weren't for the uncomfortable fact that BME graduates are significantly more likely to be out of work than their white counterparts. The industry is doing well at attracting a diverse undergraduate intake, but perhaps less well at equality on graduation.

Another factor is geography. Last year the Midlands, the South West and Scotland were where engineering made up the largest proportion of the new graduate workforce. While there were *more* engineering jobs in London than anywhere else in the country, the sector had the lowest share of the jobs market. Over 20% of all under or unemployed engineering graduates were from London.

This is an issue because graduates are not as mobile as people think. Last year, 58% of graduates went to work in the region they studied in and 69% went to work in the region they were originally domiciled – because 45% never moved at all, they went to institutions close to home and stayed locally to work.

This means that if you are an industry with a lot of large, dispersed sites outside traditional graduate employment hotspots then you need to convince graduates not just to join your industry, but to move to the places where you are located because *those* places don't supply enough engineers to meet demand.

Organisations need to learn how to convince talented young engineers from London to leave their home cities for places like Derby, Coventry, Southampton and Plymouth. Engineering graduates *do* want to be engineers, but often they want to be engineers in London, and we need to convince them to be engineers elsewhere as well.

To meet the skills shortage, companies also need to consider other routes into engineering. A common route into engineering is a three-year engineering degree and then a Masters. Why not make it easier for graduates with the right maths skills to get an engineering qualification? It would be an interesting reversal if the management consultants started complaining that their quantitative trainees were being poached by engineering firms, with their excellent training, interesting responsibilities and decent rates of pay. We know engineering roles can't always compete on pay, but there is also the benefits of quality of life, training and employment that compare favourably with auditors or financial analysts.

If we have a pipe that's leaking, we call for an engineer to fix it. The sector has its own leaky pipeline, so who better to get it patched up properly?

Charlie Ball is Head of Higher Education Intelligence at Prospects which is owned by the registered charity Higher Education Careers Services Unit (HECSU).

(2nd November 2018, https://www.theengineer.co.uk/skills-shortages-engineering-pipeline/?cmpid=tenews_6551360&utm_medium=email&utm_source=newsletter&utm_campaign=tenews&adg=25D5594B-61A5-4477-9BBF-F97F87829407)

ΑΡΘΡΑ

Η εθνική ανάγκη Ενεργού Μητρώου Γεφυρών

Θ.Π. Τάσιος

Στην εφημερίδα «Τα Νέα» δημοσιεύτηκε άρθρο του Θεοδόση Π. Τάσιου* με τίτλο «Η εθνική ανάγκη Ενεργού Μητρώου Γεφυρών»

Α. ΕΙΣΑΓΩΓΗ

1. Κάθε τεχνικό προϊόν (ένα ρούχο, ένα αυτοκίνητο, μια γέφυρα) παράγεται και χρησιμοποιείται χάρις στις ακόλουθες βασικές δράσεις:

-Μελέτη.

-Κατασκευή.

-Συντήρηση.

Είναι προφανής η ανάγκη του συνόλου αυτών των αλληλένδετων δράσεων. Παρά ταύτα, σε μερικές περιπτώσεις η φάση της Μελέτης ενδέχεται να παραλείπεται, ενώ σε πλείστες περιπτώσεις η φάση της Συντήρησης λείπει εντελώς.

2. Πρέπει όμως επίσης να σημειωθεί πως κάθε παραγγελία μιας απ' αυτές τις φάσεις, οφείλει να συνοδεύεται κι από μια αντίστοιχη διαδικασία ελέγχου της ποιότητας του έργου που ανατέθηκε. Κάθε Μελέτη λοιπόν πρέπει να εποπτεύεται, να ελέγχεται δε λεπτομερώς στο τέλος. Κάθε Κατασκευή οφείλει να συνοδεύεται από την αντίστοιχα οργανωμένη Επίβλεψη που ασκείται απ' τον Ιδιοκτήτη του έργου. Και κάθε διαδικασία Συντήρησης θα ελέγχεται απ' τους Χρήστες κατ' αξιόπιστον τρόπο. Χωρίς αυτές τις δράσεις «Διασφάλισης Ποιότητας», είναι πολύ αμφίβολο αν το τελικό προϊόν θα έχει τις επιθυμητές Επιτελεστικότητες ασφάλειας, λειτουργικότητας, περιβαλλοντικού σεβασμού και οικονομικότητας, τις οποίες απαιτήσαμε κατά την αρχική-μας παραγγελία…

3. Αφού λοιπόν η τελική συνολική Επιτελεστικότητα εξαρτάται από τόσους πολλούς παράγοντες, ευχερέστερα καταλαβαίνει κανείς την όντως παρατηρούμενη μεγάλη διασπορά συμπεριφοράς πολλών προϊόντων: «άλλο κομμάτι αυτοκινήτου σου βγαίνει καλό, κι άλλο όχι» – ακόμη κι αν έχουν την ίδια μάρκα.

Η δε κοινωνική ζημία που προκύπτει:

– είτε απ' την ατέλεια των φάσεων («δεν κάνω συντήρηση»),

– είτε απ' την απουσία διασφάλισης ποιότητας («δεν έχομε λεφτά για πλήρη έλεγχο Μελέτης και πλήρη Επίβλεψη έργου»),

είναι δυσανάλογα μεγαλύτερη απ' τις βραχυπρόθεσμες «οικονομίες» που έγιναν από τις ατελείς διαδικασίες.

4. Τέλος, πρέπει να αναφερθεί και ο παράγοντας της εξέλιξης της επιστημοτεχνικής γνώσης, της οποίας οι προγενέστερες ανεπάρκειες ενδέχεται να αιτιολογούν σημερινές βλάβες. Αυτό γίνεται φανερό σε πολλά μοντέλα αυτοκινήτων.

5. Τα ενδεχόμενα αυτά οξύνονται κι από δύο ενδεχόμενα αίτια ανηθικότητας:

-Το «φτηνό» πράμα δεν είναι κατ' ανάγκην οικονομικότερο: Είτε λόγω κρυμμένων ελαττωμάτων («υπό την πίεση της φθηνής προσφοράς που έδωσα»), είτε διότι η περιγραφή των πραγματικών ιδιοτήτων του προϊόντος δεν ήταν ειλικρινής.

– Το ενδεχόμενο, σε κάποια απ' όλες τις φάσεις να έχει παρεισφρήσει και το φαινόμενο της ετεροδοσοληψίας (δωροδοκία, μπαχτσίσι, λάδωμα αρμοδίων), αυξάνει τεραστίως τα ενδεχόμενα κακοτεχνίας – άρα αόρατου κοινωνικού κόστους.

6. Τέλος, υπάρχει και ένας παράγοντας δυσανάλογης ενίοτε μείωσης της επιτελεστικότητας ενός προϊόντος, εξαιτίας βλαπτικών δράσεων του περιβάλλοντος (χημικώς επιβλαβές περιβάλλον, πλημμύρα, σεισμός, ακραίες θερμοκρασιακές συνθήκες) ή εξαιτίας κακοχρησίας (λ.χ. υπερφόρτιση παλαιών γεφυρών από σύγχρονα μεγάλα φορτία). Η προηγηθείσα ανάλυση, παρά τη συνοπτικότητά της, είναι αρκετή για να απασχολήσει κάμποσο κατά καιρούς παρουσιαζόμενα φαινόμενα αστοχίας προϊόντων.

Β. ΤΟ ΘΕΜΑ ΤΩΝ ΓΕΦΥΡΩΝ

1. Στην ειδική περίπτωση των μεγάλων τεχνικών έργων με τόσο μεγάλη στοχευόμενη διάρκεια ζωής, πολλές απ' τις προαναφερθείσες δυνητικές αιτίες αστοχίας ενδέχεται να συντρέξουν. Και ακριβώς επειδή οι κοινωνικές συνέπειες τέτοιων αστοχιών είναι μεγάλες και (καλώς ή κακώς) εντυπωσιακότερες άλλων, όλες οι προηγμένες Χώρες έχουν από πολλών δεκαετιών τον εθνικό θεσμό του Ενεργού Εθνικού Μητρώου Γεφυρών (ΕΝΕΜΓΕ) με τους ακόλουθους στόχους;

■ Καταγράφηση έργων με τις Μελέτες τους.

■ Εκ των υστέρων αδρομερής έλεγχος Μελετών ή μερική συμπλήρωσή-τους όπου ελλείπουν.

■ Περιοδικές επιθεωρήσεις συμπεριφοράς του έργου και μέτρησης των ιδιοτήτων των υλικών τους.

■ Προγραμματισμένες επεμβάσεις όπου διαπιστώνεται η ανάγκη: Αναίρεση βλαπτικών αιτιών ή και ενίσχυση της κατασκευής.

■ Προστατευτική επαναρύθμιση κυκλοφορίας.

2. Στη Χώρα -μας, παρά τις από 40ετίας συστηματικές προσπάθειες του υπογραφομένου και σειράς σημαντικών παραγόντων του Τεχνικού Κόσμου της Χώρας, δεν υφίσταται τέτοιος ζωντανός θεσμός. Απεναντίας, φαίνεται ότι «λόγω πολυκαιρίας», μερικές αρμόδιες κρατικές Υπηρεσίες ίσως να «χάνουν» μέρος του Αρχείου των Μελετών των Γεφυρών.

Η κατάσταση αυτή εγκυμονεί πολύ μεγάλους κινδύνους, σε εθνική κλίμακα, ιδίως επειδή στη δεκαετία που ζούμε συμπληρώνεται ή υπερβαίνεται 50ετία απ' την Ανοικοδόμηση της Χώρας, και ο δυσμενής ρόλος της φυσικοχημικής γήρανσης ή της μηχανικής κόπωσης στις ανωδομές – καθώς και οι ενδεχόμενες υδραυλικές υποσκαφές στις θεμελιώσεις – αναμένεται πολύ σημαντικότερος απ' ό,τι στο παρελθόν.

3. Έχουν αναληφθεί κατά καιρούς ορισμένες προς τη σωστή κατεύθυνση πρωτοβουλίες απ' το Υπουργείο Δημοσίων Έργων, αναμένεται δε βασίμως ότι στο σημερινό Υπουργείο Υποδομών έχει ωριμάσει η βούληση για μια γενναία οργανωτική και οικονομική απόφαση για την ίδρυση ενός ΕΝΕΜΓΕ.

Ουδείς μπορεί σήμερα να αναδεχθεί την ευθύνη απουσίας Συντήρησης και Αναβάθμισης Δημοσίου Πλούτου, όταν ο καθένας-μας το πάει το αυτοκίνητό-του στο Συνεργείο κάθε εξάμηνο! Άλλωστε, για τους ίδιους λόγους έχουν ήδη ιδρυθεί στο Υπουργείο η Εθνική Αρχή Φραγμάτων και η Εθνική Αρχή Σηράγγων. Τέλος, είναι παρήγορο να αναγγείλομε ότι το Ελληνικό Τμήμα Γεφυροποιών (IABSE) σε συνεργασία με το Υπουργείο Υποδομών, διοργανώνει για το θέμα αυτό μιαν Ημερίδα στις 12.12.18.

**Ο Θεοδόσης Π. Τάσιος είναι ομότιμος καθηγητής στο Εθνικό Μετσόβιο Πολυτεχνείο*

(19 Νοεμβρίου 2018, http://ecopress.gr/?p=15246)

ΝΕΑ ΑΠΟ ΤΙΣ ΕΛΛΗΝΙΚΕΣ ΚΑΙ ΔΙΕΘΝΕΙΣ ΓΕΩΤΕΧΝΙΚΕΣ ΕΝΩΣΕΙΣ

ITA TUNNELLING AWARDS 2018

4th Edition of the ITA Tunnelling Awards 2018

Since 2015, the international competition "the ITA Tunnelling and Underground Space Awards" seeks and rewards the most ground-breaking innovation and outstanding projects in tunnelling and underground space utilization. This year the event takes place in China, Nanjing. After editions in Hager-bach, Singapore and Paris, France the fourth ITA Tunnelling Awards returned to Asia for the 2018 event. The three previous editions received more than 240 entries and 110 nominations, rewarded 30 projects and personalities and gathered more than 750 attendees.

This year, the Awards event of the International Tunnelling and Underground Space Association (ITA) was held in Chuzhou Nanjing city in China and in conjunction with the 20th CTUC, Chinese Tunnels and Underground Works Conference.

The recipient of the **LIFETIME ACHIEVEMENT** award was **Prof Evert Hoek**.

Evert Hoek was born in Zimbabwe, graduated in mechanical engineering from the University of Cape Town and became involved in the young science of rock mechanics in 1958 when he started working in research on the problems of brittle fracture associated with rockbursts in very deep mines in South Africa. His degrees include a PhD from the University of Cape Town, a DSc (Eng) from the University of London and honorary doctorates from the Universities of Waterloo and Toronto in Canada. He has been elected as a Fellow of the Royal Academy of Engineering (UK), a Foreign Associate of the US National Academy of Engineering and a Fellow of the Canadian Academy of Engineering. He has published more than 100 papers and 3 books and has posted a significant amount of information on the Internet for free downloading. He spent 9 years as a Reader and then Professor at the Imperial College of Science and Technology in London, 12 years as a Principal of Golder Associates in Vancouver, 6 years as an Industrial Research Professor at the University of Toronto and the last 17 years as an independent consulting engineer based in North Vancouver, Canada. His consulting work has included major civil and mining projects in 35 countries around the world and has involved rock slopes, dam foundations, hydroelectric projects, underground caverns and tunnels excavated conventionally and by TBM. He has retired from active consulting work but, in 2010, is still a member of consulting boards on the Seymour Capilano Twin Tunnels Project in Vancouver, Canada, The Deep Underground Science and Engineering Laboratory in the old Homestake mine in South Dakota, USA and the Codelco Norte Chuquicamata Open Pit Mine in Chile.

ΕΛΛΗΝΙΚΟ ΤΜΗΜΑ IABSE

International Association for Bridge and Structural Engineering
www.iabse.gr

Η προστασία του εθνικού πλούτου των γεφυρών

Το θέμα της συντήρησης των γεφυρών είναι αυτή την στιγμή πιο επίκαιρο από ποτέ και απασχολεί όχι μόνο τους Έλληνες Πολιτικούς Μηχανικούς αλλά το σύνολο της παγκόσμιας κοινότητας των Δομοστατικών Πολιτικών Μηχανικών. Για τον λόγο αυτό, το **Ελληνικό Τμήμα της IABSE**, σας προσκαλεί στην εκδήλωση, που διοργανώνει στα πλαίσια των δραστηριοτήτων του και έχει ως θέμα:

'Η προστασία του εθνικού πλούτου των γεφυρών'

Η εκδήλωση θα πραγματοποιηθεί στο Αμφιθέατρο του Υπουργείου Υποδομών & Μεταφορών (Αναστάσεως 2 & Τσιγάντε – Παπάγου – Αθήνα - Στάση Μετρό: «ΕΘΝΙΚΗ ΑΜΥΝΑ») την Τετάρτη, 12 Δεκεμβρίου 2018 και ώρα 3:00 το απόγευμα. Είσοδος ελεύθερη.

Πρόγραμμα Ημερίδας

15:00 - 15:15 Εναρκτήριος χαιρετισμός
Ι.Ν. Σιγάλας, Πρόεδρος Ελληνικού Τμήματος της IABSE

15:15 - 15:30 Η προστασία του εθνικού πλούτου των γεφυρών - Εισαγωγή στο αντικείμενο
Θ.Π. Τάσιος, Καθηγητής Ε.Μ.Π.

15:30 - 15:50 Επιθεώρηση και συντήρηση γεφυρών
Ι. Καρνέσης, Γενικός Διευθυντής Συγκοινωνιακών Υποδομών, Υπουργείο Υποδομών και Μεταφορών

15:50 - 16:10 Γέφυρες Εγνατίας Οδού: Οργάνωση και λειτουργία του συστήματος επιθεώρησης και συντήρησης
Π. Πανέτσος, Δρ Πολιτικός Μηχανικός – Δ/ντής Τεχνικής Υποστήριξης Έργων Ε.Ο.Α.Ε

16:10 - 16:30 Η πολιτική της Γαλλίας στο θέμα της συντήρησης των γεφυρών.
L. Llop, Δ/ντής Τμήματος διαχείρισης και συντήρησης γεφυρών της Γαλλίας (CEREMA)

16:30 - 16:50 Ήρθε η ώρα της Διοικητικής Αρχής για τις γέφυρες;
Δ. Νικολάου, τ. Γενικός Διευθυντής Συγκοινωνιακών Υποδομών, Υπουργείου Υποδομών και Μεταφορών

16:50 - 17:30 Στρογγυλή τράπεζα: Συζήτηση επί των παρουσιάσεων – Συμπεράσματα
Συντονιστής: *Γ. Πενέλης, Καθηγητής Α.Π.Θ.*

ΠΡΟΣΕΧΕΙΣ ΓΕΩΤΕΧΝΙΚΕΣ ΕΚΔΗΛΩΣΕΙΣ

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

The 1st International Symposium on Debris flow mechanisms and mitigation for sustainable development, Hong Kong, 2nd December 2018, Email: ceclarence@ust.hk)

Second JTC1 Workshop on Triggering and Propagation of Rapid Flow-Like Landslides, 03-05 December 2018, Hong Kong, Email: ceclarence@ust.hk

Ελληνική Γεωλογική Εταιρία
Geological Society of Greece

Ετήσια Ομιλία της Ε.Γ.Ε.
"Γ. Μαρίνος - Ι. Παπασταματίου" 2018
Πέμπτη, 13 Δεκεμβρίου 2018

Winter School on GEOMECHANICS for ENERGY and the ENVIRONMENT, 22nd-24th January 2019, Villars-sur-Ollon, Swiss Alps, https://gete-school.epfl.ch

Intensive Short-Course on "Energy Geostructures: Analysis and Design" - 2nd Edition, March 6 to 8, 2019, Lausanne, Switzerland , www.formation-continue-unil-epfl.ch/en/formation/energy-geostructures-analysis-design

4th Annual URBAN UNDERGROUND SPACE & TUNNELLING 25th – 27th March 2019, Singapore, http://email.marcusevans-lse.com/files/amf_marcus_evans/project_3935/AS-IF5039_-_Catherine.pdf

ICASGE'19 International Conference on Advances in Structural and Geotechnical Engineering 2019, 25 - 28 March 2019, Hurghada, Red Sea, Egypt, http://icasge.com/conference/308

GROUND ENGINEERING INSTRUMENTATION AND MONITORING 2019

Sharing best practice and driving project efficiency
26 Mar 2019, London, United Kingdom
https://monitoring.geplus.co.uk

Ground Engineering is delighted to bring you our ninth Instrumentation and Monitoring conference on **Tuesday 26 March 2019** - an essential gathering for anyone involved in monitoring and looking for up-to-date insight into projects, technologies and techniques.

These are exciting times for the industry as major projects ramp up ready for construction, new techniques begin to change how we monitor, and clients look to better understand their assets and how to manage the associated risks.

Whether you are a project manager on a complex tunnel scheme, a designer looking to mitigate the risks to third party assets, or a client wanting to improve knowledge of your structures, this is an important event for you to attend.

Join us to discover answers to the most pressing questions in the industry:

- What lessons should be taken from current projects and how this can influence the future of monitoring?
- To what extent are the technologies and techniques now available, changing how we deliver projects?
- What role does monitoring have in asset management and will it become more widely spread in the future?
- Has data collation caught up with the accuracy of collection and what further advances are needed to deal with big data

The 2019 programme will cover topics including:

- Best practice in analysing and effectively using asset data
- Innovations in monitoring equipment and their potential applications onsite
- Insight into future major monitoring projects and the specifications that clients and contractors are seeking

Booking enquiries

Sophie Carus, 020 3953 2651, Sophie.Carus@emap.com

13th Australia New Zealand Conference on Geomechanics 2019, 01 ÷ 03-04-2019, Perth, Australia, http://geomechanics2019.com.au

AFRICA 2019 Water Storage and Hydropower Development for Africa, 2-4 April 2019, Windhoek, Namibia, www.hydropower-dams.com/pdfs/africa19.pdf

EGU General Assembly 2019, NH9.12 Natural hazard impacts on technological systems and infrastructures, 7–12 April 2019, Vienna, Austria, https://meetingorganizer.copernicus.org/EGU2019/session/32510

4th Annual Innovation in Tunnels
11 to 12 April 2019, Amsterdam, Netherlands
www.tunnelsconference.com

With over 25 live tenders for construction/development of new tunnels in just Spain, Switzerland Italy and Belgium at the time of writing this, it is safe to say that tunnel construction/ development is growing at a very fast rate. Our last 3 Annuals on Tunnels – Fire and Safety in Amsterdam have touched on the maintenance as well as the safety aspect of tunnels as the title suggests. However, the 4th Annual is going to be slightly different.

EnigmaCG's 4th Annual Conference on Innovation in Tunnels: Construction, Maintenance, Safety & Fire Protection touches on all aspects of a tunnel. Innovation and the emerging of new technologies that go along with a tunnel will always be highly sought after to ensure that not just newly developed but also existing tunnels adhere to these best practices.

We at EnigmaCG are building on our success and bring you our 4th edition, a two-day bonanza on the 11th and 12th of April 2019 again in Amsterdam, Netherlands. EnigmaCG's event will cover topics not just in our back garden but as far as Asia tying up the importance of economics and safety along with the importance of ventilation and why did the Swedish Transport Administration install a fixed firefighting system to be installed in all 11km of its road tunnels.

If you are interested to know more about the above topics mentioned as well as what were the mistakes that have been made in the past such as the tunnels in Norway and the latest findings in Tunnels, Construction, Maintenance, Fire & Safety then this is a must attend event for you and your colleagues.

Join us for 2 days of exclusive networking sessions, professional and interactive panel discussions as well as high level case studies combatting the challenges, successes as well as lessons learnt from construction, Maintenance, as well as the unfortunate catastrophes where damage and sadly lives have been lost on the 11th and 12th of April 2019.

Contact:

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New Bond House
124 New Bond Street
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OMIŠ 2018 8th Conference of Croatian Geotechnical Society with international participation Geotechnical challenges in karst - Karl Terzaghi and karst in Croatia 110 years ago, 11.-13. April 2019, Omiš, Split, Croatia, www.hgd-cgs.hr/savjetovanja/omis-2019

IICTG 2019 2nd International Intelligent Construction Technologies Group Conference "Innovate for Growth, Collaborate for Win-Win", 23-04-2019 - 25-04-2019, Beijing, China, www.iictg.org/2019-conference

WTC2019 Tunnels and Underground Cities: Engineering and Innovation meet Archaeology, Architecture and Art and ITA - AITES General Assembly and World Tunnel Congress, 3-9 May 2019, Naples, Italy, www.wtc2019.com

3rd Meeting of EWG Dams and Earthquakes
An International Symposium
May 6-8, 2019, Lisbon, Portugal
http://ewg2019.lnec.pt

This international symposium is the third annual meeting of the ICOLD European Club Working Group "Dams and Earthquakes", following the very successful events in St.Malo and Rome. The effective application of the demanding regulations for the seismic safety of dams requires advanced and robust models and methods of analysis. There are many outstanding issues, namely those related to the definition of seismic hazard, the dynamic behaviour of materials and structures, or the numerical techniques, which need to be tested and validated. In this meeting, experts are invited to discuss all these issues. The deliverables of the symposium will be fundamental packages of qualification of seismic analyses: case studies of comparison of model results with experimental data, measurements of dam response under seismic events or dynamic monitoring.

Themes

- Definition of seismic hazard for dams
- Measurements of response of concrete or embankment dams under earthquakes
- Dynamic monitoring and testing of dams
- Comparison of numerical models with dynamic field measurements
- Qualification of equipment under seismic loading

Contacts

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Organizing Committee
Dr. Jorge Pereira Gomes
ewg2019@lnec.pt / (+351) 218443361

2019 Rock Dynamics Summit in Okinawa, 7-11 May 2019, Okinawa, Japan, www.2019rds.org

International Conference on Silk-roads Disaster Risk Reduction and Sustainable Development, May 11-12, Beijing, China, www.sidrr.com

4th Joint International Symposium on Deformation Monitoring (JISDM), 15 to 17 May, 2019, Athens, Greece, www.jisdm2019.survey.ntua.gr

TRANSOILCOLD 2019 Transportation Soil Engineering in Cold Regions, 20 –23 May 2019, St. Petersburg, Russia, http://conf-geotech.wixsite.com/transoilcold2019

International Course on GEOTECHNICAL and STRUCTURAL MONITORING
27-31 May 2019, Rome, Italy
www.geotechnicalmonitoring.eu

We are pleased to announce that the **6th International Course on Geotechnical and Structural Monitoring** will take place in **Rome from May 27 to 31, 2019**.

In the five past IcGSM editions new contents and new ideas were proposed to ensure **every year a new course experience**. To continue this growth **important novelties** are proposed also in this edition.

The new General Schedule now includes:

- 2 days of Master Classes (May 27-28, 2019)
- 1 full day of Field Trip with real technical demonstrations (May 29, 2019)
- 2 days of Main Course (May 30-31, 2019)

Don't miss the 6th IcGSM and join the Geotechnical and Structural Community in 2019! Take a look at the **2019 IcGSM teaser video** and go back to the most exciting moments of the last year edition!

Underground Construction Prague 2019, June 3–5, 2019, Prague, Czech Republic, www.ucprague.com

VII ICEGE ROMA 2019 - International Conference on Earthquake Geotechnical Engineering, 17 - 20 June 2019, Rome, Italy, www.7icege.com

ICONHIC2019 - 2nd International Conference on Natural Hazards and Infrastructure, 23-26 June 2019, Chania, Crete Island, Greece, https://iconhic.com/2019/conference

COMPDYN 2019 7th International Conference on Computational Methods in Structural Dynamics and Earthquake Engineering, 24-26 June 2019, Crete, Greece, www.compdyn.org

IS-GLASGOW 2019 - 7th International Symposium on Deformation Characteristics of Geomaterials, 26 - 28 June 2019, Glasgow, Scotland, UK, https://is-glasgow2019.org.uk

cmn 2019 -Congress on Numerical Methods in Engineering, July 1 - 3, 2019, Guimarães, Portugal, www.cmn2019.pt

7th Asia-Pacific Conference on Unsaturated Soils, August 23~25, 2019, Nagoya, Japan, www.jiban.or.jp/e/activities/events/20190823-25-seventh-asia-pacific-conference-on-unsaturated-soils

The 17th European Conference on Soil Mechanics and Geotechnical Engineering, 1st - 6th September 2019, Reykjavik Iceland, www.ecsmge-2019.com

SECED 2019 Conference Earthquake risk and engineering towards a resilient world, 9-10 September 2019, Greenwich, London, U.K., www.seced.org.uk/2019

15th International Benchmark Workshop on Numerical Analysis of Dams
9th - 11th September 2019, Milano, Italy
www.eko.polimi.it/index.php/icold-bw2019

Numerical modelling has become the indispensable and powerful tool for design and safety assessment of dams. The tremendous development of computer hardware and software over the last decades has made it possible the extraordinary development of computer-based methods. The Benchmark Workshops organized by the ICOLD Committee "Computational Aspects of Analysis and Design of Dams" since 1991 provide an excellent opportunity for engineers, researchers and operators to present and exchange their experiences and the latest developments related to the design, performance and monitoring of dams.

Topics

Theme A: Seismic analysis of Pine Flat concrete dam.

Formulators: USBR and University of Colorado Boulder (USA). KTH (Sweden). RSE (Italy)

Theme B: Seismic analyses of Menta Embankment dam. *Formulators: Cassino and Southern Lazio University; Perugia University; So.Ri.Cal. SpA (Italy*)

Theme C: Coupled hydromechanical analysis of the pre-failure and the failure behaviour of a levee on soft subsoil. *Formulators: Politecnico di Milano (Italy). Delft University of Technology and STOWA (The Netherlands*)

Open Theme: Papers related to numerical modelling of dams and/or appurtenant structures

Short course held by Prof. A.K. Chopra

On 12**th** and 13**th** September 2019, a short course on **Modern Methods for Nonlinear Earthquake Response History Analysis of Concrete Dams** will be given by **Professor Anil K. Chopra** (University of California, Berkeley) in collaboration with his research associates.

Information and Registration icold-bw2019@polimi.it

3rd International Conference "Challenges in Geotechnical Engineering" CGE-2019, 10-09-2019 - 13-09-2019, Zielona Gora, Poland, www.cgeconf.com

14th ISRM International Congress, 13-18 September 2019, Iguassu Falls, Brazil, www.isrm2019.com

1st MYGEC 1st Mediterranean Young Geotechnical Engineers Conference, Double Events – MYGEC & EYGEC, 23-24th September, 2019, Bodrum, Muğla, Turkey, http://mygec2019.org

27th EYGEC 27th European Young Geotechnical Engineers Conference, Double Events – MYGEC & EYGEC, 26-27th September, 2019, Bodrum, Muğla, Turkey, http://eygec2019.org

3rd ICTITG International Conference on Information Technology in Geo-Engineering, Sep. 29-02 Oct., 2019, Guimarães, Portugal, www.3rd-icitg2019.civil.uminho.pt

11th ICOLD European Club Symposium, 2 - 4 October 2019, Chania Crete – Greece, www.eurcold2019.com

4ο Πανελλήνιο Συνέδριο Αντισεισμικής Μηχανικής και Τεχνικής Σεισμολογίας *20 Χρόνια Μετά...*, Αθήνα, 4-6 Οκτωβρίου, 2019, www.eltam.org

XVII African Regional Conference on Soil Mechanics and Geotechnical Engineering

07-10 October 2019, Cape Town, South Africa

www.arc2019.org

The South African Institution of Civil Engineering cordially invites all our colleagues from Africa and beyond to attend the 17th African Regional Conference on Soil Mechanics and Geotechnical Engineering.

Hosted in one of the continent's most iconic cities, this conference will serve practitioners, academics and students of all geotechnical backgrounds. The conference will take place at the Cape Town International Convention Centre (CTICC) offering world class conferencing facilities in the heart of South Africa's mother city and will offer extensive opportunities for Technical Committee Meetings, Workshops, Seminars, Exhibitions and Sponsorships. Exciting Technical Visits, including tours to the famous Robben Island, await.

The main theme of the 17th ARCSMGE is "**Innovation and Sustainability in Geotechnics for Developing Africa**". The theme originates from the fact that Africa as a whole suffers from a pronounced infrastructural deficit when compared to other developed countries and regions.

Therefore, both innovative and sustainable infrastructure is crucial for Africa's economic integration. As such, the vision of improved geotechnics is a positive notion directed at the development of the continent.

The conference theme is broad and inclusive; presenting a range of opportunities to stakeholders from the entire geotechnical industry.

The 7th African Young Geotechnical Engineers' Conference (8 – 10 October 2019) will commence on 8 October 2019, the day following the African Regional Conference (ARC) opening. The conference venue will be shared with the ARC delegates to initiate dialogue between junior and senior engineers while young geotechnical engineers acquaint themselves with the industry standards, new geotechnical developments and resources available to further their careers. The YGE conference provides an approachable audience within a vibrant environment where young presenters under the age of 35 are encouraged to exercise their presentation and technical writing skills on a continental platform.

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HYDRO 2019

Concept to closure: practical steps

14-16 October 2019, Porto, Portugal

www.hydropower-dams.com/hydro-2019

HYDRO 2019 will be the 26th in our annual series of HYDRO conferences, and the third to take place in Portugal, following HYDRO 2004 in Porto and HYDRO 2010 in Lisbon.

Portugal is an ideal European host country for the global hydropower community, with a wealth of experience and expertise to share, in all forms of hydropower: from large-scale pumped-storage plants to large and small run-of-river installations. The country has about 7200 MW of installed hydro capacity, including pumped-storage; and typically hydro contributes more than 15 000 GWh/year of electricity.

The country's strong emphasis on all forms of renewable energy has underlined the need for pumped storage, and a number of large hydro or pumped-storage plants have been upgraded in recent years to add new reversible units.

Some of the most important schemes completed in the past few years are: Salamonde II (207 MW), Baixo Sabor (151 MW), Foz Tua (252 MW) and Frades II (780 MW). Construction is under way on the 1158 MW Alto Tâmega complex, which comprises the Gouvães, Alto Tâmega and Daivoes hydro plants.

As always, the focus will be on global issues, especially promoting best practices and advancing hydro development in less developed countries.

The theme 'Concept to closure: Practical steps' is inspired by the emphasis at preceding conferences on good project preparation and general planning, to encompass thorough site studies, stakeholder involvement and corporate social multidisciplinary planning, and careful selection of equipment.

Key topics will therefore be: planning and finance, innovative approaches to design and construction, safety and disaster risk management, modelling, selection of robust and efficient equipment, and environmental and social issues.

Additional topics, of increasing importance throughout the world, will be capacity building and training, climate resilience, cross-border collaboration, and maximizing the potential of existing hydro assets.

CONFERENCE THEMES

The themes set out below do not represent the final titles of sessions, which will be decided after papers have been selected for presentation. If you would like to suggest an additional subject for discussion which is not listed below, this could be considered for a session, panel discussion or workshop.

- POTENTIAL, PLANNING AND FINANCE
- CLIMATE RESILIENCE AND HYDROLOGY
- ENVIRONMENT AND SOCIAL ASPECTS
- INTERNATIONAL PARTNERSHIPS
- OPERATION
- DEALING WITH HAZARDS AND RISKS
  Disaster risk management as part of design
  Seismic engineering
  Challenging site conditions
  Warning systems and evacuation planning
- HYDRAULIC MACHINERY
- ELECTRICAL ENGINEERING
- CIVIL ENGINEERING
  Innovative civil design
  Construction challenges and solutions
  Materials for dams
  Civil engineering upgrades
  Aesthetic aspects of dam design
  Sedimentation
- SAFETY OF WATER INFRASTRUCTURE
  Dam safety and monitoring systems
  Safety around dams
  Hydro plant safety including cyber security
- PUMPED STORAGE
  The role and benefits of pumped storage
  Innovations in pumped-storage technology
- SMALL AND LOW HEAD HYDROPOWER
- CAPACITY BUILDING AND TRAINING

Contact

HYDRO 2019, Mrs Margaret Bourke, Conference Project Manager, Aqua~Media International, PO Box 285, Wallington, Surrey, SM6 6AN, UK Tel: +44 20 8773 7244 Fax: + 44 20 8773 7255 Email: Hydro2019@hydropower-dams.com

XVI Asian Regional Conference on Soil Mechanics and Geotechnical Engineering, 21 - 25 October 2019, Taipei, China www.16arc.org

XVI Panamerican Conference on Soil Mechanics and Geotechnical Engineering, 18-22 November 2019, Cancun, Quintana Roo, Mexico, http://panamerican2019mexico.com/panamerican

YSRM2019 - The 5th ISRM Young Scholars' Symposium on Rock Mechanics and REIF2019 - International Symposium on Rock Engineering for Innovative Future - Future Initiative for Rock Mechanics and Rock Engineering - Collaboration between Young and Skilled Researchers/Engineers – 1-4 December 2019, Okinawa, Japan, www.ecpro.co.jp/ysrm2019/index.html

15th International Conference on Geotechnical Engineering, and
9th Asian Young Geotechnical Engineers Conference
05 ÷ 07-12-2019, Lahore, Pakistan
http://15icge-9aygec.uet.edu.pk

The Pakistan Geotechnical Engineering Society (PGES) under the aegis of International Society of Soil Mechanics and Geotechnical Engineering (ISSMGE) takes pleasure in hosting 9th Asian Young Geotechnical Engineers Conference and its

15th International Conference on Geotechnical Engineering from December 5 to December 7, 2019; in Lahore, Pakistan.

9AYGEC

This conference will be the ninth in its series following the first in Bangkok (1991), the second in Singapore (1994), the third in Singapore (1997), the fourth in Seoul (2001), the fifth in Taipei (2004), the sixth in Bangalore (2008), the seventh in Tokushima (2012) and the eighth in Astana (2016). This conference aims at providing an interactive platform for the young geotechnical engineers from across Asia. Young Geotechnical Engineers and researchers below the age of 35 years from Asian countries will participate in this Conference. Each of the National Geotechnical Societies in Asia is invited to nominate two participants from its country to submit research papers in the conference.

15ICGE

The 15th international conference with broad theme of "Geotechnical Engineering" has been kept to attract a diversity of quality papers from around the globe. This Conference will act as a platform for the exchange of technical ideas between Clients, Consultants, Contractors, and Manufacturers. Outstanding keynote lectures, presentations, and technical discussions will afford the opportunity to explore the advancements in geotechnical engineering. 15ICGE will provide the attendees to share their expertise along with seeking new collaborations and meet the expertees of the relevant fields.

CONFERENCE THEMES

- Ground Improvement
- Liquefaction Potential and Mitigation
- Risk Assessment in Geotechnical Engineering
- Geomatics Techniques
- Earthquake Geotechnical Engineering
- Deep Excavations
- Numerical Modelling
- Geotechnical Analysis & Design
- Case Histories
- Natural and Induced Seismicity
- Risk Preparedness and Early Warning Systems
- Dams And Hydropower
- Field Investigations and Laboratory Testing
- Environmental Geotechnics
- Tunneling and Underground Structures
- Hazard Zonification
- Problematic Soils

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Facebook: https://web.facebook.com/groups/pges.pak/

14th Baltic Sea Geotechnical Conference 2020
25 ÷ 27 May 2020, Helsinki, Finland

Organiser: Finnish Geotechnical Society
Contact person: Leena Korkiala-Tanttu
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Website: http://www.ril.fi/en/events/bsgc-2020.html
Email: ville.raassakka@ril.fi

Nordic Geotechnical Meeting
27-29 May 2020, Helsinki, Finland

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EUROCK 2020
Hard Rock Excavation and Support
June 2020, Trondheim, Norway

Contact Person: Henki Ødegaard, henki.oedegaard@multiconsult.no

DFI Deep Mixing 2020
15 to 17 June 2020, TBD, Gdansk, Poland

Organizer: Deep Foundations Institute
Contact person: Theresa Engler
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Phone: 19734234030
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Email: tengler@dfi.org
Website: http://www.dfi.org
Email: staff@dfi.org

4th European Conference on Unsaturated Soils - Unsaturated Horizons
24-06-2020 ÷ 26-06-2020, Lisbon, Portugal

Organiser: IST, TUDelft and UPC
Contact person: info@EUNSAT2020.tecnico.ulisboa.pt

Website: http://www.EUNSAT2020.tecnico.ulisboa.pt

Geotechnical Aspects of Underground Construction in Soft Ground
29 June to 01 July 2020, Cambridge, United Kingdom

Organiser: University of Cambridge
Contact person: Dr Mohammed Elshafie
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Phone: +44(0) 1223 332780
Email: me254@cam.ac.uk

16th International Conference of the International Association for Computer Methods and Advances in Geomechanics – IACMAG
29-06-2020 ÷ 03-07-2020, Torino, Italy

The 16th International Conference of the International Association for Computer Methods and Advances in Geomechanics (15IACMAG) will be held in Turin, Italy, 29 June - 4 July 2020. The aim of the conference is to give an up-to-date picture of the broad research field of computational geomechanics. Contributions from experts around the world will cover a wide range of research topics in geomechanics.

Pre-conference courses will also be held in Milan and Grenoble.

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EUROGEO WARSAW 2020 7th European Geosynthetics Congress, 6-9 September 2020, Warsaw, Poland, www.eurogeo7.org

6th International Conference on Geotechnical and Geophysical Site Characterization
07-09-2020 ÷ 11-09-2020, Budapest, Hungary
www.isc6-budapest.com

Organizer: Hungarian Geotechnical Society
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Email: huszak@mail.bme.hu
Website: http://www.isc6-budapest.com
Email: info@isc6-budapest.com

5TH World Landslide Forum Implementation and Monitoring the USDR-ICL Sendai Partnerships 2015-2015, 2-6 November 2020, Kyoto, Japan, http://wlf5.iplhq.org

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

ΕΝΔΙΑΦΕΡΟΝΤΑ ΓΕΩΤΕΧΝΙΚΑ ΝΕΑ

Trapped bus passenger films huge landslide in the Philippines

https://www.facebook.com/euronews/videos/285813988952125/

(από Γιώργο Κοσσένα)

Stanford researcher says sinkhole responsible for Xe-Pian Xe-Namnoy hydro project collapse

The Xe-Pian Xe-Namnoy saddle dam hours before the final breach. Nighttime failure release half a million cubic meters of water on villages below.

Richard Meehan, a Stanford University researcher, has concluded that the failure of the Xe-Pian Xe-Namnoy hydro project in southern Laos can be attributed to the extended western arm of the reservoir being built on a sinkhole.

The failure occurred on July 23, 2018, leading to the confirmed death of at least 40 persons. The reservoir behind the dam, which impounds water for a hydroelectric facility with a capacity of 410 MW, had just been filled. The failure sent a half-billion cubic meter cascade of muddy water over a 200-meter waterfall.

Meehan began his engineering career designing and building dams in Thailand and has taught courses for many years at Stanford's School of Earth Sciences and also at the Blume Earthquake Engineering Center. He has been investigating the dam's failure from Bangkok using new space technologies.

Below is an explanation of his work and findings:

The world-wide ground elevation dataset SRTM 1-arc second (ground elevations on a 30-meter grid for most of the earth), made available in 2015 by NASA, finds applications in understanding of global hazardous conditions and disasters, new and old.

Explanations for the failure have previously been announced, with some blaming it on excessive rain and others on substandard saddle dam construction. As of the end of September 2018, official investigations had reportedly not yet been started in part because of difficulty in accessing the high plateau but also because of the unexpected appointment of independent investigators by various parties and their lawyers, suggesting the likelihood of prolonged adversarial investigations.

But satellite ground elevation data and imagery, when combined with readily available archival information from mineral explorations, along with experience on dam projects in similar terrain in nearby Northeast Thailand and in other comparable areas of tropical soils, show that this extended western arm of the reservoir was built on a sinkhole -- a dry basin that probably never, even over millennia, had retained any of the heavy (1-4 meters) summer rainfall that drenched the plateau.

The failure hypothesis goes as follows: On the first filling of the reservoir, a wave of groundwater from the main reservoir pushed southwest, eventually filling the dry basin behind the saddle dam with 20 m of water. The progress of the underground wave can be tracked by rising springs visible on cloud-piercing satellite images from the Sentinel 1 satellite. Rising water pressures, still within the normal operating specifications for the project but unprecedented in geological time, enlarged underground free-draining conduits within the naturally fragile basalt ridge line that supported the saddle dam. With a rising water level and loss of support, the brittle earthfill dam began to sink into the void and crack extensively. The rising reservoir then cascaded over or through the fragmented crest, washing away the remnants of the dam and 15 meters of erodible foundation and spilling half a billion cubic meters of water and debris.

Aside from the telltale dry basin, other known risk factors were present: geological formations with known high subsurface water mobility and storage, including presence of volcanic lavas with high leakage potential at local (soil-filled joints) and larger scale (collapse features such as lava tubes, caves and possibly exploded features from flash water vaporization); an interface between lava and very old sedimentary rocks with weathered cracks and voids along with stress conditions favoring expanded flows under increased pressure; and tropical soil weathering profiles long known by dam builders for their instability. The dam embankment consisted

almost entirely of fill composed of local residual soils susceptible to rapid internal erosion and disintegration when cracked and subjected to high water pressures.

These high risk factors raise the question of whether this type of tropical geography is suitable for the aggressive and loosely managed "hydropower rush" that is now under way in remote regions of Laos. Whether the predictable foundation and water retention problems advanced were ever investigated or considered during construction of the saddle dam is not known.

(Elizabeth Ingram, Managing Editor / HYDRO REVIEW, 11/08/2018, https://www.hydroworld.com/articles/2018/11/stanford-researcher-says-sinkhole-responsible-for-xe-pian-xe-namnoy-hydro-project-collapse.html)

Tehran's drastic sinking exposed by satellite data

Parts of Iran's capital city, home to 13 million people, are subsiding by 25 centimetres each year.

Tehran is one of the most populated cities in western Asia.

Tehran, western Asia's largest city by population, is sinking.

Now, detailed satellite images reveal the extent of the problem, including that some parts of the Iranian capital are falling by as much as 25 centimetres a year, and that the collapse is spreading to encompass the city's international airport1.

Geoscientists Mahdi Motagh and Mahmud Haghshenas Haghighi, both at the GFZ German Research Centre for Geosciences in Potsdam, used satellite data to monitor subsidence across the Tehran region between 2003 and 2017.

Previous work2 had shown that Tehran is sinking and had linked the sinkage to the depletion of groundwater aquifers, which are being sucked dry to irrigate nearby farmland and serve greater Tehran's 13 million or so residents3.

The latest data put new figures on the problem. The western Tehran Plain — a mix of Tehran's urban sprawl, satellite cities and agricultural land — is subsiding at a rate of 25 centimetres per year, and the Varamin Plain, an agricultural region to the southeast of the city, is subsiding at a similar rate. The city's international airport — located southwest of Tehran — is sinking 5 centimetres annually.

"These are amongst some of the highest current rates of subsidence in the world," says Roberto Tomás, an engineer at the University of Alicante in Spain.

Losing ground

Subsidence, caused by growing populations and increased extraction of underground water, oil and gas, is a problem in cities globally. For example, previous satellite measurements have shown that some areas of Jakarta are sinking at more than 20 centimetres per year4, and the San Joaquin Valley in California — home to several cities — by up to 60 centimetres per year.

The new study, which has been accepted for publication in *Remote Sensing of Environment,* estimates that around 10% of the urban area of Tehran is affected, along with many satellite towns and villages to the city's southwest. "When walking around these areas, we see uneven street surfaces, shifted curbs, cracks in the walls and even tilted buildings, some of which have had to be demolished," says Motagh.

Huge fissures — several kilometres in length and up to four metres wide and deep — have opened up in the land to the southeast of Tehran, some of which are threatening to topple power-transmission lines and buckle railways.

And the growth of underground cracks sometimes produces sudden sinkholes. "One farmer I met was locked up for hours when the ground gave way beneath him and he fell into a six-metre-deep crack," says Ali Beitollahi, head of engineering seismology at the Building and Housing Research Center in Tehran. Such farmland is becoming unviable, because the cracks drain irrigation water from the surface and leave crops parched.

The growth of underground cracks sometimes produces sudden sinkholes in the ground.

Surveys carried out over the past year by Beitollahi and his colleagues estimate that the areas with significant subsidence in and around Tehran host 120 kilometres of railway, 2,300 kilometres of road, 21 bridges, 30 kilometres of oil pipeline, 200 kilometres of gas pipeline, 70 kilometres of high-voltage electricity lines and more than 250,000 buildings.

Urban sprawl

Motagh and Haghshenas Haghighi's data show how the subsidence has marched steadily eastwards since 2003, starting with agricultural land and encroaching on the urban fringes of the city. Another subsidence zone is creeping towards Tehran's airport.

A combination of population growth — the city's population has doubled in the past 40 years — droughts and large dams, which capture rainwater and prevent aquifers from recharging, has exacerbated the problem.

The authorities are fighting a losing battle as they try to regulate water extraction. Beitollahi believes that some 100,000 illegal wells have been blocked across Iran, but an estimated 30,000 are still in operation across Greater Tehran.

The sinking that has already happened might be irreversible, the study hints. By looking at water depth measurements from wells in the affected areas, the researchers found that the ground is failing to bounce back, even after rainfall, which suggests that the porosity of the rock has been permanently lost. That loss could lead to more flash flooding, says Linlin Ge, an engineer at the University of New South Wales in Sydney, Australia, because without pores, the water no longer has anywhere to go.

doi: 10.1038/d41586-018-07580-x

(Kate Ravilious / Nature, 30 November 2018, https://www.nature.com/articles/d41586-018-07580-x)

Περιοχές της Τεχεράνης βουλιάζουν έως και 25 εκ. κατ' έτος!

Η Τεχεράνη, η πόλη με το μεγαλύτερο πληθυσμό στη Δυτική Ασία, βυθίζεται σταδιακά. Όπως αποκαλύπτουν δορυφορικές εικόνες, μερικές περιοχές της ιρανικής πρωτεύουσας «βουλιάζουν» έως κατά 25 εκατοστά ετησίως.

Μάλιστα το πρόβλημα της καθίζησης φαίνεται να επηρεάζει και το διεθνές αεροδρόμιο της πόλης, σύμφωνα με τους γεωεπιστήμονες.

Οι ερευνητές του Γερμανικού Κέντρου Γεωεπιστημονικών Ερευνών GFZ του Πότσνταμ, που θα κάνουν σχετική δημοσίευση στο περιοδικό τηλεπισκόπησης του περιβάλλοντος «Remote Sensing of Environment», σύμφωνα με το «Nature», ανέλυσαν δορυφορικά δεδομένα της περιόδου 2003-2017 για να υπολογίσουν την αργή καθίζηση της πόλης των περίπου 13 εκατομμυρίων κατοίκων (ο πληθυσμός έχει διπλασιασθεί τα τελευταία 40 χρόνια).

Ήταν γνωστό από προηγούμενες έρευνες ότι η Τεχεράνη έχει πρόβλημα υποχώρησης του εδάφους, το οποίο πιστεύεται ότι σχετίζεται σε μεγάλο βαθμό με τον υδροφόρο ορίζοντα, ο οποίος συνεχώς υποχωρεί λόγω των ολοένα αυξανόμενων αναγκών για ύδρευση των κατοίκων και για άρδευση των πέριξ αγροτικών καλλιεργειών. Υπολογίζεται ότι περίπου 30.000 παράνομα πηγάδια υπάρχουν στην ευρύτερη περιοχή της Τεχεράνης.

Η νέα μελέτη αποκαλύπτει καλύτερα από κάθε άλλη φορά το μέγεθος του προβλήματος. Η δυτική Τεχεράνη (ένα μείγμα προαστίων και αγροτικών γαιών) υποχωρεί με μέσο ετήσιο ρυθμό έως 25 εκατοστά το χρόνο, ενώ με τον ίδιο ρυθμό καταβυθίζεται και η αγροτική περιοχή Βαραμίν στα νοτιοανατολικά της πόλης. Οι ρυθμοί αυτοί καθίζησης είναι από τους υψηλότερους στον κόσμο.

Το διεθνές αεροδρόμιο, στα νοτιοδυτικά της Τεχεράνης, υποχωρεί με μέσο ρυθμό πέντε εκατοστών ετησίως. Η μελέτη εκτιμά ότι περίπου το ένα δέκατο (10%) του αστικού συγκροτήματος της πόλης επηρεάζεται, καθώς επίσης πολλές δορυφορικές πόλεις και χωριά, ιδίως στα νοτιοδυτικά της Τεχεράνης.

«Όταν περπατά κανείς σε αυτές τις περιοχές, βλέπει ανώμαλες επιφάνειες δρόμων, μετατοπισμένα κράσπεδα, ρωγμές σε τοίχους, ακόμη και κτίρια που γέρνουν, μερικά από τα οποία πρέπει να γκρεμιστούν», δήλωσε ο ιρανικής καταγωγής επικεφαλής ερευνητής Μαχντί Μοτάγκ.

Στα νοτιοανατολικά της Τεχεράνης έχουν εμφανισθεί στο έδαφος τεράστιες ρωγμές μήκους αρκετών χιλιομέτρων, με βάθος και πλάτος έως τεσσάρων μέτρων. Μερικές απειλούν να γκρεμίσουν τους γειτονικούς πυλώνες του ηλεκτρικού ρεύματος ή να λυγίσουν τις ράγες του τρένου. Σε κάποιες περιπτώσεις, οι υπόγειες μετακινήσεις δημιουργούν ξαφνικές καθιζήσεις που «καταπίνουν» ανθρώπους, όπως ένας αγρότης, ο οποίος έπεσε σε μια τέτοια τρύπα βάθους έξι μέτρων και έμεινε εκεί για ώρες, ώσπου να απεγκλωβιστεί.

Σύμφωνα με τις μελέτες υπηρεσιών της πόλης, οι περιοχές μέσα και γύρω από την Τεχεράνη που αντιμετωπίζουν σοβαρό πρόβλημα καθίζησης, περιλαμβάνουν 120 χιλιόμετρα σιδηροδρομικών γραμμών, 2.300 χιλιόμετρα οδικού δικτύου, 21 γέφυρες, 30 χιλιόμετρα αγωγών πετρελαίου, 200 χιλιόμετρα αγωγών φυσικού αερίου, 70 χιλιόμετρα γραμμών ηλεκτρικού υψηλής τάσης και περισσότερα από 250.000 κτίρια.

Η νέα δορυφορική ανάλυση δείχνει ότι μετά το 2003 το πρόβλημα μετακινείται σταδιακά προς τα ανατολικά της πόλης, ενώ φαίνεται να επηρεάζει όλο και περισσότερο το διεθνές αεροδρόμιό της. Η καθίζηση είναι μάλλον μη αναστρέψιμη, καθώς το έδαφος δεν φαίνεται να ανυψώνεται ούτε μετά από έντονες βροχές, όταν αναπληρώνεται σε ένα βαθμό ο υδροφόρος ορίζοντας.

Και άλλες πάντως πόλεις του κόσμου έχουν παρόμοιο πρόβλημα. Μερικές περιοχές της Τζακάρτας, πρωτεύουσας της Ινδονησίας, καθιζάνουν τουλάχιστον 20 εκατοστά το χρόνο, ενώ στην κοιλάδα Σαν Χοακίν στην Καλιφόρνια, όπου βρίσκονται αρκετές πόλεις, η καθίζηση φθάνει τα 60 εκατοστά ετησίως.

(3 Δεκεμβρίου 2018, https://slpress.gr/eidiseis/perioches-tis-techeranis-voyliazoyn-eos-kai-25-ek-kat-etos/)

ΕΝΔΙΑΦΕΡΟΝΤΑ - ΣΕΙΣΜΟΙ

Italian earthquake data hint at possibility of forecasting one type of quake

Study suggests how 'sequence' quakes are constrained by their geology, which could allow scientists to forecast the large follow-up shakes.

Sequence earthquakes, such as the ones that struck central Italy in 2016, can be devastating.

An analysis of a string of three deadly earthquakes that struck Italy in 2016 suggests that they occurred in a sequence constrained by their geology.

The conclusion, which has provoked some excitement among earthquake researchers, raises the tantalizing possibility that seismologists could produce useful forecasts of the quakes that follow this type of quake — called a sequence quake — potentially saving lives.

But many challenges remain, including how to helpfully communicate risk to people who might be affected.

Currently, seismologists can forecast earthquakes only in the vaguest of terms — say, a 30% chance over a large region in the next 50 years.

Stop-start shocks

Most earthquakes take the form of a single large quake followed by aftershocks of decreasing size. But in an event such as the 2016 Italian sequence quake energy is released in a stop-start manner, in which several large quakes are interspersed by smaller aftershocks. Scientists aren't sure why this happens.

The latest research — which was published in August[1] and will be presented at the American Geophysical Union Fall Meeting in Washington DC in December — describes an underlying arrangement of cross-cutting faults, which act as barriers and prevent the earthquake strain in the larger, major fault, from being released in one go.

The results suggest that the arrival of underground water and gas, driven by the build-up of strain, release these barriers — and that tracking the movement of underground fluids could help to provide a warning of subsequent quakes.

Forecasting where and when subsequent quakes might happen could allow people living in the path of any expected, follow-up earthquakes to evacuate in time. This could be invaluable, given that subsequent quakes can be big and deadly: in a sequence quake that hit the Indonesian island of Lombok in July and August, the second quake killed some 460 people.

Sequence quakes occur in all tectonically active areas of the world, but they are thought to be more prevalent in geologically young fault systems. In Italy's Apennine mountains, which run the length of the country, they occur every few decades, most recently in 2016, 1997 and 1979.

A deadly trio

More than 300 people died between 24 August and 30 October 2016, when three earthquakes hit the region, each larger than magnitude 6. The small, historic town of Amatrice was badly damaged by the first quake: more than three-quarters of its buildings were flattened and 299 people died.

"Essentially, we can consider sequence quakes as 'failed' big earthquakes," says Richard Walters, a geophysicist at Durham University, UK, who led the research. "The initial stress conditions are the same, but the cascading rupture of multiple segments takes place over days to weeks instead of over seconds."

To find out why, Walters and his colleagues took advantage of the wealth of satellite data that captured the Italian quakes.

The satellites — part of Europe's Sentinel Earth-observing constellation — provided images of the shape of the ground surface. Because the data were gathered roughly every 1.5 days, the scientists were able to compare images from before and after each quake, and calculate exactly how the ground had moved.

On the basis of satellite pictures — and seismological and ground-based measurements — Walters' team reports that a network of smaller, cross-cutting faults underlies the Apennine region. The researchers say that these small faults act as barriers to the rupture process, preventing the major faults from being 'unzipped' in one go.

Had the faults all failed in one go, the region would have experienced a single earthquake with a magnitude of about 6.7 — some 50% bigger than the largest of the three quakes that struck.

Instead, the energy was released in a sequence of three quakes over the course of a few weeks.

Under pressure

In between the larger quakes, the scientists observed a wave of thousands of small aftershocks, which crept northwards at a rate of around 100 metres a day. The team found that this matched the expected speed at which naturally occurring underground water and gas would move, driven by unreleased strain, suggesting that the pressure changes associated with the fluid movement are generating the small aftershocks.

"The pattern of small aftershocks suggests that each subsequent quake is triggered by the increased pressure associated with fluids being pumped through the network of minor faults," says Walters.

The second earthquake, two months after the first, occurred exactly when the aftershocks — and fluid, as predicted by the researchers' models — arrived at the next major fault.

Walters and his colleagues suspect that the whole of the region's major fault was ready to give way, but the cross-cutting smaller faults held the energy back until the underground fluids arrived, triggering the next movement. "The fluids are being driven by pressure changes. When they reach a fault, the increased pressure 'unclamps' the fault and allows it to move," says Walters.

Nicola D'Agostino, a geoscientist at the National Institute of Geophysics and Volcanology in Rome, thinks it plausible that such a mechanism could explain why the quakes occurred in a sequence.

Data challenge

If underground fluids are the trigger for sequence quakes, then monitoring their movement after the first quake in a predicted sequence could give clues about the timing and location of subsequent quakes, says Walters, potentially allowing a forecast.

Stephen Hicks, an earthquake scientist at the University of Southampton, UK, agrees. "The challenge will be to monitor and interpret the data quickly enough to provide a meaningful forecast," he says. "But it is possible that in the future we can exploit machine-learning technology, to help us rapidly process lots of different earthquake scenarios."

The underground fault network would need to be well mapped, and a good seismometer network put in place. The Apennine region would be a prime candidate for this kind of detailed monitoring system, says Walters, but many other earthquake-prone parts of the world could ultimately benefit, too.

Seismologists would also need high-powered computer simulations of fluid movement in the fault network. Walters thinks that with appropriate investment and political will, such a system could be established within a decade.

Communicating risk

Hicks thinks that the findings will change the way geoscientists work. "Normally we don't try and interpret aftershocks until later, but I think this will spur scientists into analysing more subtle features in real time," he says. He also thinks that the work could apply to other types of earthquake. "Similar barrier mechanisms could be influencing big earthquakes in subduction zones."

Roland Bürgmann, a geoscientist at the University of California, Berkeley, says that such detailed understanding of the fault system and movement of fluids could make a big difference to improving short-term forecasts of earthquake hazards.

D'Agostino agrees that it's theoretically possible to forecast the later ruptures in sequence quakes, but thinks it could be tricky to predict whether a quake is a one-off event or whether it is the start of a sequence.

And even if scientists could produce a 'quake forecast', communicating the risk is fraught with difficulty, as Italy's 2009 L'Aquila quake tragedy — which killed some 300 people — showed. This was not a sequence quake, but it does highlight the challenges of communicating earthquake risk.

In the months preceding that quake, the region experienced hundreds of minor earthquakes, sparking rumours of an imminent, larger quake. In line with their assessment of the scientific evidence, geoscientists downplayed the rumours, saying minor earthquakes weren't sure predictors of major ones.

But days later, a deadly magnitude-6.3 quake struck. The geoscientists ended up in court, accused of providing "incomplete, imprecise and contradictory information" information to the public — although the initial guilty verdict was ultimately overturned.

"The L'Aquila quake showed just how challenging it is to communicate uncertainty," says Hicks. "If we can start to forecast earthquakes over the timescale of weeks then we will have to be careful not to cause too much panic or give false alarms."

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Στο βυθό μεταξύ Σκύρου, Λέσβου και Αγίου Ευστρατίου υπάρχουν 19 μεγάλα ενεργά ρήγματα

Ο βυθός του Αιγαίου ανάμεσα στη Σκύρο, στη Λέσβο και στον Άγιο Ευστράτιο κρύβει συνολικά 19 μεγάλα ενεργά ρήγματα, μήκους άνω των επτά χιλιομέτρων το καθένα, τα οποία μπορούν να δώσουν ισχυρούς σεισμούς μεγέθους 6,1 έως 7,4 βαθμών. Οκτώ από αυτά τα ρήγματα μπορούν να «δώσουν» σεισμούς, άνω των επτά βαθμών.

Αυτό προκύπτει από νέες έρευνες Ελλήνων γεωεπιστημόνων στην περιοχή, με υπεύθυνο της επιστημονικής ομάδας τον καθηγητή του Τμήματος Γεωλογίας και Γεωπεριβάλλοντος του Πανεπιστημίου Αθηνών, Δημήτρη Παπανικολάου.

Από τα 19 ενεργά ρήγματα, που χαρτογραφήθηκαν τώρα για πρώτη φορά, μόνο τα τρία ήσαν γνωστά κατά τις τελευταίες δεκαετίες και περιλαμβάνονταν στους σεισμικούς καταλόγους. Οι επιστήμονες θεωρούν ότι «έχει υποεκτιμηθεί ο δυνητικός σεισμικός κίνδυνος της περιοχής» και ότι «αυτά τα ρήγματα έχουν τη δυνατότητα να δημιουργήσουν ισχυρούς σεισμούς που μπορούν να προκαλέσουν καταστροφές στα γύρω νησιά».

Σύμφωνα με τις εκτιμήσεις των ερευνητών, οι οποίοι έκαναν τη σχετική δημοσίευση στο περιοδικό «Marine Geology» (Θαλάσσια Γεωλογία), εκτός από το ρήγμα του Αγίου Ευστρατίου που "έδρασε" με σεισμό μεγέθους 7,1 βαθμών, προκαλώντας 20 θανάτους το 1968 και το οποίο χρειάζεται κάποιους αιώνες για να ενεργοποιηθεί ξανά, καθώς, επίσης, τρία ακόμη ρήγματα που «έδωσαν» μικρότερους σεισμούς κατά τα τελευταία 30 χρόνια, τα υπόλοιπα ρήγματα μπορούν να δώσουν μεγάλο σεισμό μεγέθους 6,1 έως 7,3 βαθμών, χωρίς όμως να είναι δυνατό να προσδιορισθεί χρονικά εάν αυτός θα συμβεί σε μερικά χρόνια ή σε δεκάδες χρόνια.

Η σχεδόν τριγωνική Λεκάνη της Σκύρου, που κυμαίνεται σε βάθη 600 έως 1.050 μέτρων, έχει παρόμοια τεκτονική δομή με εκείνη της γειτονικής Λεκάνης του Βορείου Αιγαίου, αλλά με μικρότερες διαστάσεις και πιο αργούς ρυθμούς παραμόρφωσης. Η ενεργοποίηση των ρηγμάτων στην περιοχή της Λεκάνης της Σκύρου και η έναρξη καταβύθισης της περιοχής άρχισε πολύ πρόσφατα, πριν από λίγες εκατοντάδες χιλιάδες χρόνια, γι' αυτό και στον πυθμένα της ρηχής πλατφόρμας γύρω από τη λεκάνη συναντάται απευθείας το παλιό αλπικό υπόβαθρο, με λίγα μόνο πρόσφατα ιζήματα πάχους μερικών δεκάδων μέτρων.

Οι επιστήμονες επιδιώκουν να χαρτογραφούν με μεγάλη λεπτομέρεια τα υποθαλάσσια ρήγματα, προκειμένου να γνωρί-

ζουν το δυναμικό τους και το μέγεθος του σεισμού που μπορούν να δώσουν. Ο βυθός της Λεκάνης της Σκύρου είχε μελετηθεί με το ωκεανογραφικό πλοίο «Αιγαίο» το 2002, το 2003 και το 2013.

Στη νέα μελέτη παρουσιάζονται επεξεργασμένα νέα ψηφιακά στοιχεία, που αποκτήθηκαν από τις ωκεανογραφικές έρευνες, σχετικά με τη βαθυμετρία και την ανάλυση του ανάγλυφου του θαλάσσιου πυθμένα. Αναλύονται επίσης δεδομένα σεισμικής ανάκλασης για την ανίχνευση των γεωλογικών στρωμάτων και των τεκτονικών δομών, κυρίως των ρηγμάτων στο υπόβαθρο κάτω από τον θαλάσσιο πυθμένα, σε βάθος πολλών εκατοντάδων μέτρων, κατά μήκος της Λεκάνης της Σκύρου, η οποία έχει μήκος 120 χιλιομέτρων και πλάτος 10 έως 40 χλμ.

Μεταξύ άλλων ευρημάτων, διαπιστώθηκε ότι οι συνολικές μετατοπίσεις στα ρήγματα είναι της τάξης του ενός έως ενάμιση χιλιομέτρου, με τη δημιουργία υποθαλάσσιων κρημνών ύψους πολλών εκατοντάδων μέτρων.

«Η έρευνα αυτή συμπληρώνει παλαιότερη έρευνα της Λεκάνης του Βορείου Αιγαίου μεταξύ Βορείων Σποράδων - Λήμνου - Χαλκιδικής, που είχε δημοσιεύσει η ίδια ερευνητική ομάδα στη δεκαετία του 2000. Έτσι, τώρα υπάρχει πια μία ολοκληρωμένη εικόνα της όλης τεκτονικής δομής και του σεισμικού κινδύνου στο Βόρειο Αιγαίο, όπου και αναπτύσσεται το βόρειο όριο της Μικροπλάκας του Αιγαίου, η οποία αποχωρίζεται από την Μακεδονία - Θράκη με ταχύτητα περίπου 20-25 χιλιοστόμετρα ανά έτος», δήλωσε στο Αθηναϊκό και Μακεδονικό Πρακτορείο Ειδήσεων η Επίκουρη Καθηγήτρια του Τμήματος Γεωλογίας και Γεωπεριβάλλοντος του ΕΚΠΑ Παρασκευή Νομικού.

Εκτός από το σεισμό των 7,1 βαθμών στις 19 Φεβρουαρίου 1968 με επίκεντρο κοντά στον Ευστράτιο (που είχε προκαλέσει και μικρό τσουνάμι ως τη Λήμνο), οι άλλοι μεγάλοι μεταπολεμικοί σεισμοί στην περιοχή ήσαν στις 4 Μαρτίου 1967 στη Λεκάνη της Σκύρου (6,2 βαθμοί) και στις 19 Δεκεμβρίου 1981 στην ανατολική περιοχή της ίδιας λεκάνης (6,8 βαθμοί), ο οποίος προκάλεσε περισσότερες ζημιές στη Λέσβο από ό,τι στη Σκύρο, ενώ είχαν ακολουθήσει ισχυροί μετασεισμοί, με τον μεγαλύτερο 6,3 βαθμούς στις 27/12/1981. Υπήρξε επίσης στις 26 Ιουλίου 2001 ένας σεισμός 6,4 βαθμών λίγα χιλιόμετρα νοτιοδυτικά της Σκύρου, σε βάθος 13 χλμ.

Την επιστημονική εργασία "συνυπογράφουν" ο αναπληρωτής καθηγητής Ιωάννης Παπανικολάου του Γεωπονικού Πανεπιστημίου Αθηνών και οι ερευνητές του Ελληνικού Κέντρου Θαλασσίων Ερευνών (ΕΛΚΕΘΕ) Γρηγόρης Ρουσάκης και Ματίνα Αλεξανδρή, καθώς επίσης η υποψήφια διδάκτωρ Δανάη Λαμπρίδου του ΕΚΠΑ.

(Gazzetta team, Παρασκευή, 09 Νοεμβρίου 2018, http://www.gazzetta.gr/plus/koinwnia/article/1290411/stovytho-metaxy-skyroy-lesvoy-kai-agioy-eystratioy-yparhoyn-19-megala-energa-rigmata)

Active tectonics and seismic hazard in Skyros Basin, North Aegean Sea, Greece

D. Papanikolaou, P. Nomikou, I. Papanikolaou, D. Lampridou, G. Rousakis, M. Alexandri

1. Introduction

The Skyros Basin trends ENE-WSW and is located in the North Aegean Sea, developed southwards and sub parallel to the North Aegean Basin. It is similar but smaller compared to the North Aegean Basin, but both accommodate extension and shearing due to the westward propagation of the North Anatolian Fault, that breaks into two major branches (McKenzie, 1970, 1978; Papadimitriou and Sykes, 2001; Kreemer et al., 2004). In fact, the North Aegean basin runs parallel to the plate boundary of the Aegean micro-plate and the Skyros Basin borders the deformation of the plate margin to the south as a secondary tectonic structure. However, both basins/structures can be traced to the SW into the Central Hellenic Shear Zone (CHSZ) in continental Greece, which constitutes the microplate boundary until the Hellenic Trench (Papanikolaou and Royden, 2007) (Fig. 1). Thus, the area of the North Aegean and Skyros Basins represents a transition from extension in the SW (exerted by the pull of the retreating Hellenic subduction zone) to dextral strike slip in the east (accommodated by the lateral westward escape of Anatolia). In contrast to the well-studied North Aegean Basin (Papanikolaou et al., 2002, 2006; Papanikolaou and Papanikolaou, 2007), the morphology and tectonic structure of the Skyros Basin are poorly known (e.g. Mascle and Martin, 1990 and preliminary summary results of Skyros Basin by Papanikolaou et al., 2015). The scope of this study is to map in detail the bathymetry, the active faults and the overall geometry and structure of the Skyros Basin and to assess its seismic potential.

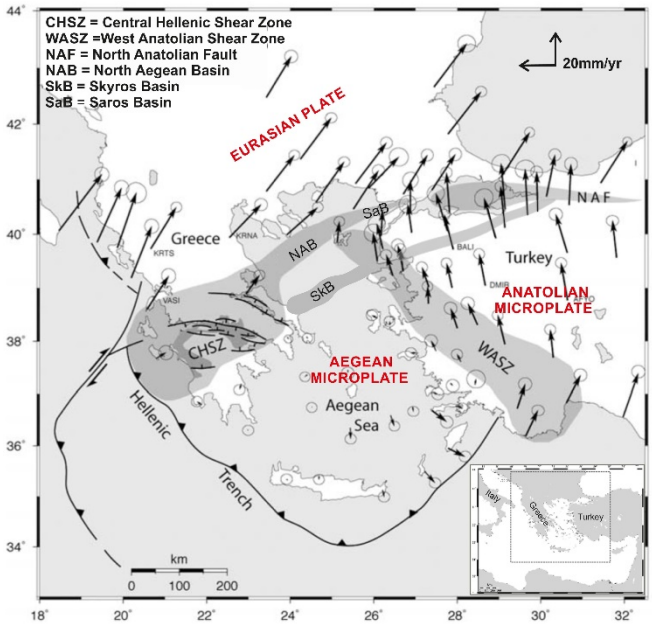

Fig. 1. The location of Skyros Basin (SkB) to the south of the North Aegean Basin (NAB) along the northern boundary of the Aegean micro-plate. It relates to the east with the North Anatolian Fault (NAF) and to the southwest with the Central Hellenic Shear Zone (CHSZ), forming a tectonic zone that borders the GPS rate of the Eurasian plate, which is opening obliquely. GPS velocities are in a reference frame that minimizes the average velocity of the Aegean, based on data from McClusky et al. (2000) (modified from Papanikolaou and Royden, 2007). SkB and NAB correspond to the minor and major respectively strands of the west prolongation of NAF.

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4.2.3. Simplified tectonic map

The simplified tectonic map of the Skyros Basin comprises 9 sub-basins at depths varying from 1050 m at the southwest to 600 m to the northeast. Three tectonic segments with different tectonic regimes can be distinguished along the 150 km long Skyros Basin (Fig. 11).

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6. Conclusions

High resolution bathymetry combined with single-channel reflection seismic lines reveal for the first time the structure of

the Skyros Basin that forms part of the southern offshore branch of the North Anatolian Fault. The Skyros Basin has a similar structure to the neighbouring North Aegean Basin, but has smaller dimensions and lower deformation rates. Both basins are characterised by oblique opening with predominant dextral strike slip movement on ENE-WSW trending faults in the eastern part and NE-SW extension with normal faulting dominating the western part. The subsidence of the Skyros-Limnos Platform mainly occurred since Middle Pleistocene times. The thickness of the post Alpine sediments exceeds 700 m in the western and central part, whereas towards the eastern part, the maximum thickness was determined at 600 m. Skyros Basin is controlled by a ENE-WSW trending 111 km long south marginal fault structure that splits in two major segments of 66 and 45 km.19 seismic sources have been mapped that can generate strong earthquakes exceeding $M > 6.0$ (8 of which $M \geq 7.0$). The worst-case scenario implies a multi-segment rupture of the 111 km long dominant ENE-WSW south marginal fault that can produce a $M = 7.45$. The majority of these seismic sources have not been activated in the time frame covered by the historical catalogues, implying that the seismic hazard is underestimated. Only three of the 19 seismic sources have been recorded in the historical catalogues.

The 2001 $M = 6.4$ event occurred on a sinistral offshore NW-SE trending fault a few km NW from the Skyros Basin. It was the first such focal mechanism activating a NW-SE trending fault that was recorded in the North Aegean, confirming that these faults are also active. Four such parallel NW-SE trending faults that can generate earthquakes with $M \geq 7.0$ have been traced offshore eastwards the island of Skyros. The transition from extension, due to the SW pull of the Hellenic subduction zone, to the strike slip motion along the western prolongation of the North Anatolian Fault in the North Aegean and Skyros Basins is a characteristic example worldwide. The triangular geometry observed in the two Aegean basins may be used as a model for oblique opening cases, intermediate between the usual pull apart basins, formed along strike slip zones and tectonic grabens formed perpendicular to extensional stresses.

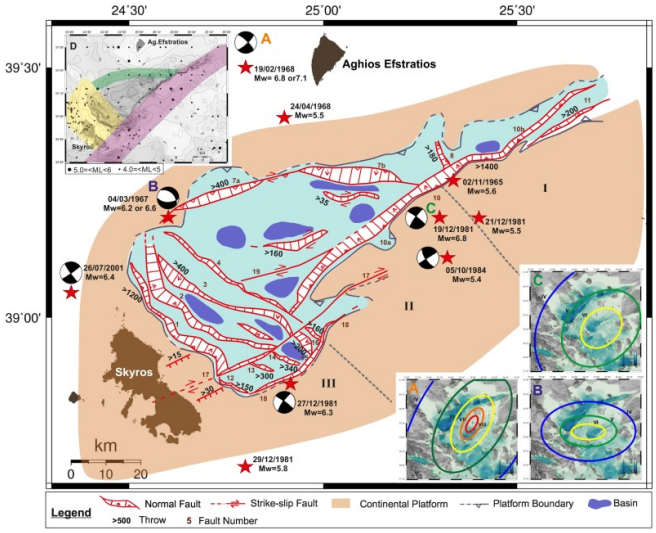
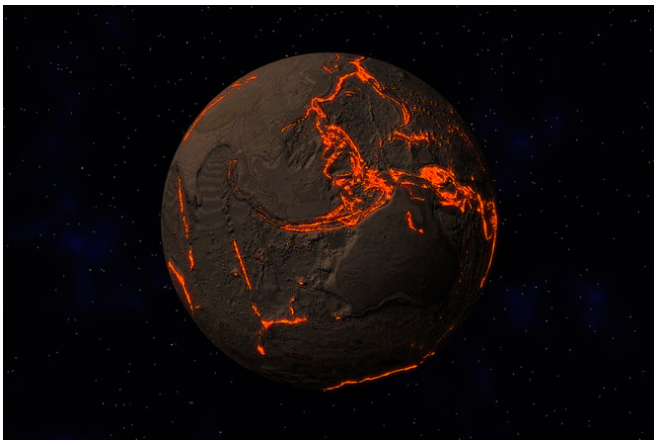


Fig. 11. Tectonic map of the Skyros Basin based on single-channel reflection seismic lines and bathymetric data interpretation. Faults are distinguished into two types: i) solid red line with dip vectors, indicating normal fault character that creates submarine scarps, ii) red line with strike slip vectors, indicating strike slip faults that usually do not affect bathymetry. Smaller sub basins are distinguished in blue, the platform is highlighted in orange. Bold numbers indicate the throw in meters and thin red numbers correspond to the numbering of the faults (see also Table 1). The red stars correspond to the earthquake epicentres of the major events that occurred within the basin, for which we dispose focal mechanisms. Inset maps (A, B, C) show the main earthquake events $M \geq 5.4$ recorded since the 1960s in the Skyros Basin and surrounding area with their focal mechanisms and their isoseismal maps, where available (based on Kiratzi and Louvari, 2003 and Papazachos et al., 1997 respectively). Inset map D shows the earthquake events since 1964 for magnitude ≥ 4. The three marginal fault zones of Skyros Basin are also shown in shaded colours. (For interpretation of the references to colour in this figure legend, the reader is referred to the web version of this article.)

https://www.sciencedirect.com/science/article/pii/S0025322718301701#f0005

ΕΝΔΙΑΦΕΡΟΝΤΑ - ΓΕΩΛΟΓΙΑ

The Earth Is Eating Its Own Oceans



At earthquake-prone subduction zones, where tectonic plates dive beneath one another, massive amounts of sea water are dragged into the planet's interior, a new study has revealed.

As Earth's tectonic plates dive beneath one another, they drag three times as much water into the planet's interior as previously thought.

Those are the results of a new paper published today (Nov. 14) in the journal Nature. Using the natural seismic rumblings of the earthquake-prone subduction zone at the Marianas trench, where the Pacific plate is sliding beneath the Philippine plate, researchers were able to estimate how much water gets incorporated into the rocks that dive deep below the surface.

The find has major ramifications for understanding Earth's deep water cycle, wrote marine geology and geophysics researcher Donna Shillington of the Lamont-Doherty Earth Observatory at Columbia University in an op-ed accompanying the new paper. Water beneath the surface of the Earth can contribute to the development of magma and can lubricate faults, making earthquakes more likely, wrote Shillington, who was not involved in the new research.

The deep water cycle

Water is stored in the crystalline structure of minerals, Shillington wrote. The liquid gets incorporated into the Earth's crust both when brand-new, piping-hot oceanic plates form and when the same plates bend and crack as they grind under their neighbors. This latter process, called subduction, is the only way water penetrates deep into the crust and mantle, but little is known about how much water moves during the process, study leader Chen Cai of Washington University in St. Louis and his colleagues wrote in their new paper.

"Before we did this study, every researcher knew that water must be carried down by the subducting slab," Cai told Live Science. "But they just didn't know how much water."

The researchers used data picked up by a network of seismic sensors positioned around the central Marianas Trench in the western Pacific Ocean. The deepest part of the trench is nearly 7 miles (11 kilometers) below sea level. The sensors detect earthquakes and the echoes of earthquakes ringing through Earth's crust like a bell. Cai and his team tracked how fast those temblors traveled: A slowdown in velocity, he said, would indicate water-filled fractures in rocks and "hydrated" minerals that lock up water within their crystals.

Missing water

The researchers observed such slowdowns deep into the crust, some 18 miles (30 km) below the surface, Cai said. Using the measured velocities, along with the known temperatures and pressures found there, the team calculated that the subduction zones pull 3 billion teragrams of water into the crust every million years (a teragram is a billion kilograms).

Seawater is heavy; a cube of this water 1 meter (3.3 feet) long on each side would weigh 1,024 kilograms (2,250 lbs.). But still, the amount pulled down by subduction zones is mind-boggling. It's also three times as much water as subduction zones were previously estimated to take in, Cai said.

And that raises some questions: The water that goes down must come up, usually in the contents of volcanic eruptions. The new estimate of how much water is going down is larger than estimates of how much is being emitted by volcanos, meaning scientists are missing something in their estimates, the researchers said. There is no missing water in the oceans, Cai said. That means the amount of water dragged down into the crust and the amount spouted back out should be about equal. The fact that they aren't suggests that there's something about how water moves through the interior of Earth that scientists don't yet understand.

"Many more studies need to be focused on this aspect," Cai said.

(Stephanie Pappas, Live Science Contributor / LIVESCIENCE, November 14, 2018, https://www.livescience.com/64091-earth-is-eating-its-oceans.html?utm_source=ls-newsletter&utm_medium=email&utm_campaign=20181118-ls)

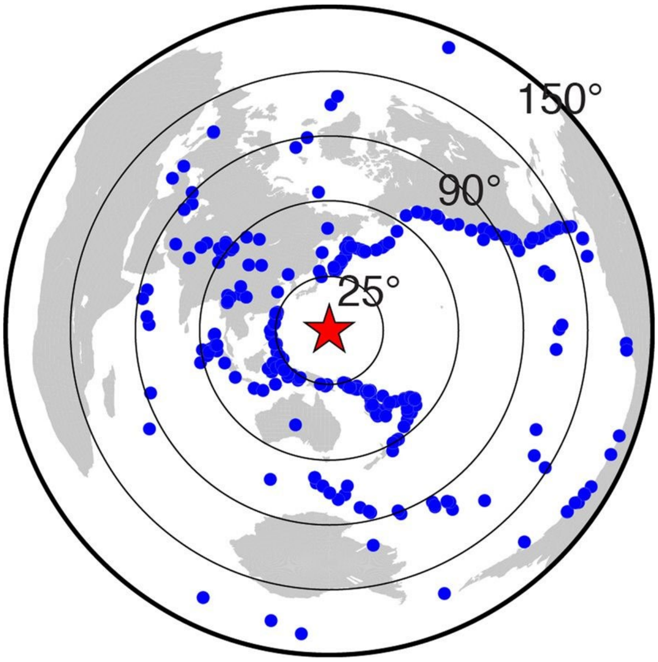
Water input into the Mariana subduction zone estimated from ocean-bottom seismic data

Chen Cai, Douglas A. Wiens, Weisen Shen & Melody Eimer

Abstract

The water cycle at subduction zones remains poorly understood, although subduction is the only mechanism for water transport deep into Earth. Previous estimates of water flux exhibit large variations in the amount of water that is subducted deeper than 100 kilometres. The main source of uncertainty in these calculations is the initial water content of the subducting uppermost mantle. Previous active-source seismic studies suggest that the subducting slab may be pervasively hydrated in the plate-bending region near the oceanic trench. However, these studies do not constrain the depth extent of hydration and most investigate young incoming plates, leaving subduction-zone water budgets for old subducting plates uncertain. Here we present seismic images of the crust and uppermost mantle around the central Mariana trench derived from Rayleigh-wave analysis of broadband ocean-bottom seismic data. These images show that the low mantle velocities that result from mantle hydration extend roughly 24 kilometres beneath the Moho discontinuity. Combined with estimates of subducting crustal water, these results indicate that at least 4.3 times more water subducts than previously calculated for this region. If other old, cold subducting slabs contain correspondingly thick layers of hydrous mantle, as suggested by the similarity of incoming

plate faulting across old, cold subducting slabs, then estimates of the global water flux into the mantle at depths greater than 100 kilometres must be increased by a factor of about three compared to previous estimates. Because a long-term net influx of water to the deep interior of Earth is inconsistent with the geological record, estimates of water expelled at volcanic arcs and backarc basins probably also need to be revised upwards.



Blue dots represent ISC earthquake locations. The red star shows the location of the Mariana trench.

Fig. 4: Earthquakes used in this study.

Nature, Volume 563, pages 389–392 (2018), https://www.nature.com/articles/s41586-018-0655-4

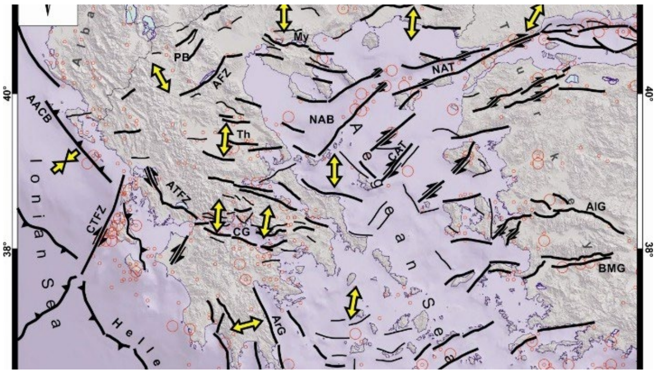
Μοιάζει να είναι σχέδιο

This is an excellent example of two intergrown cubes of pyrite, from Navajún, La Rioja, Spain.

Amazing Geologist, 17 Νοεμβρίου 2018, https://www.facebook.com/AmazingGeologist/

(από τον συνάδελφο Γιάννη Μεταξά)

Αχαρτογράφητα ρήγματα στη Β. Ελλάδα αποτύπωσε η γεωλογική μελέτη για τον ΤΑΡ



Ρήγματα τα οποία δεν ήταν χαρτογραφημένα, αλλά και περιοχές στη Βόρεια Ελλάδα, όπως μια μεγάλη ρηξιγενής ζώνη μεταξύ Καβάλας- Ξάνθης- Κομοτηνής, οι οποίες δεν συνδέονται με κάποιον μεγάλο σεισμό, όμως τα γεωμορφολογικά τους στοιχεία εκτιμώνται ως ενδείξεις ότι μπορεί να ενεργοποιηθούν ρήγματα και πιθανά και με μεγάλα μεγέθη, αποτύπωσε η γεωλογική έρευνα στο πλαίσιο της περιβαλλοντικής μελέτης για την κατασκευή του αγωγού φυσικού αερίου ΤΑΡ.

Παράλληλα, γνωστά και μελετημένα ενεργά ρήγματα κοντά στο πολεοδομικό συγκρότημα της Θεσσαλονίκης, όπως αυτό του Ανθεμούντα, κρίνεται αναγκαίο να μελετηθούν περαιτέρω με εξειδικευμένες μεθόδους ως προς τα σεισμοτεκτονικά χαρακτηριστικά τους και τη συμπεριφορά τους, ώστε να εκτιμηθούν οι επιπτώσεις τους στην ανθεκτικότητα έργων υποδομής, δικτύων και κτιρίων του ευρύτερου πολεοδομικού συγκροτήματος.

Τα στοιχεία παρουσιάστηκαν σε εκδήλωση με θέμα «Γεωλογία - ενεργά ρήγματα και επιπτώσεις στα σημαντικά τεχνικά έργα της Θεσσαλονίκης», που πραγματοποιήθηκε στο Τμήμα Κεντρικής Μακεδονίας του Τεχνικού Επιμελητηρίου Ελλάδας (ΤΕΕ/ΤΚΜ).

«Οι χάρτες κλίμακας 1:5.000 για τον ΤΑΡ έδειξαν άγνωστα ρήγματα»

Στην Ελλάδα, οι επίσημοι χάρτες των ρηγμάτων είναι αυτοί του ΙΓΜΕ, ανέφερε ο επίκουρος καθηγητής Γεωλογίας του ΑΠΘ Αλέξανδρος Χατζηπέτρος, μιλώντας για τον ρόλο των ενεργών ρηγμάτων στις μελέτες μεγάλων τεχνικών έργων, μέσα από το παράδειγμα του αγωγού φυσικού αερίου ΤΑΡ και τη γεωλογική μελέτη για τον αγωγό, που του ανατέθηκε να κάνει στην Ελλάδα όσο και την Αλβανία, με εξαίρεση το υποθαλάσσιο κομμάτι.

Κυριότερο πρόβλημα των γεωλογικών χαρτών στην Ελλάδα, όπως εξήγησε, είναι η κλίμακα, «που δεν δίνει ακριβώς τη θέση του ρήγματος, ενώ ένα άλλο πρόβλημα είναι ότι επειδή οι χάρτες έχουν γίνει σε διαφορετικές περιόδους, με διαφορετικές ερμηνείες, πολλοί από αυτούς δεν δείχνουν ρήγματα τα οποία υπάρχουν -για παράδειγμα στη Σαμοθράκη, αλλά και

πάρα πολλά άλλα ρήγματα στην Ελλάδα- και το τρίτο πρόβλημα είναι ότι επειδή γίνονται από διαφορετικούς ανθρώπους υπάρχουν και διαφορετικές ερμηνείες». Για τον λόγο αυτό, εκτίμησε, κρίνεται αναγκαία για τη χώρα «μία γεωλογική χαρτογράφηση μεγάλης κλίμακας».

Σε ό,τι αφορά τον ΤΑΡ από την κοινοπραξία ζητήθηκε μία εκτίμηση της επικινδυνότητας των ρηγμάτων, που τέμνουν τον αγωγό σε ακτίνα σεισμικής απόκλισης 200 συν 200 χιλιόμετρων και χρησιμοποιήθηκαν όλα τα υπάρχοντα δεδομένα «αυτά που ήταν δημοσιευμένα, όπως και αυτά που δεν ήταν δημοσιευμένα, αλλά είχαμε πρόσβαση, π.χ. σεισμικές τομές που έχουν γίνει για υδρογονάνθρακες, αντίστοιχες γεωλογικές τομές κ.λπ.».

Στο πλαίσιο της μελέτης των ρηγμάτων με τους γεωλογικούς χάρτες κλίμακας 1:50.000 σύμφωνα με τον καθηγητή διαπιστώθηκε ότι «τα χαρτογραφημένα ρήγματα στον ελληνικό χώρο είναι εκατοντάδες και ανάλογα με τον τρόπο χαρτογράφησης και ανάλογα με το πώς ερμηνεύει κανείς τα δεδομένα, μπορεί να οδηγηθεί σε εντελώς διαφορετικά αποτελέσματα». «Βλέπουμε, για παράδειγμα, πολλά μικρά ρήγματα χαρτογραφημένα, τα οποία δεν μας είναι χρήσιμα. Το πρόβλημα είναι ότι και οι γεωλογικοί χάρτες και η αποτύπωση των ρηγμάτων ήταν πολύ απλοποιημένα. Στο επόμενο στάδιο πήγαμε σε μεγαλύτερη κλίμακα, είδαμε τα χαρτογραφημένα ρήγματα, τα οποία τέμνουν τον αγωγό σε μία απόσταση 2 συν 2 χιλιόμετρα και για όλα αυτά έγινε η σχετική ανάλυση», εξήγησε ο κ. Χατζηπέτρος. Αντίστοιχα στους αλβανικούς γεωλογικούς χάρτες, όπου η επίσημη κλίμακα είναι 1:25.000, διαπιστώθηκε πως στην πορεία του αγωγού δεν αποτυπώνονταν αρκετά ρήγματα, τα οποία έτεμναν τον αγωγό, κάποια από αυτά και εγκάρσια. Τα ρήγματα αυτά αποτύπωσε η χαρτογράφηση κλίμακας 1:5.000 που έγινε για τον ΤΑΡ.

«Η γεωλογική χαρτογράφηση έδειξε πολλά ρήγματα που τέμνουν τον αγωγό και περιοχές που πιθανώς να ήταν προβληματικές για την κατασκευή του», πρόσθεσε ο καθηγητής, ενώ για την Βόρεια Ελλάδα ανέφερε πως μελετήθηκε «μία μεγάλη ρηξιγενής ζώνη μεταξύ Καβάλας- Ξάνθης- Κομοτηνής, στην οποία έχουμε το πρόβλημα ότι δεν συνδέεται σίγουρα με κάποιον μεγάλο σεισμό, όμως τα γεωλογικά, τα γεωμορφολογικά στοιχεία και όλες οι ενδείξεις μας κάνουν να ανησυχούμε».

Σε ό,τι αφορά τις μετατοπίσεις των ρηγμάτων διευκρίνισε πως «στον ελλαδικό χώρο για μεγάλους σεισμούς περιμένουμε να είναι γύρω στο 1-1,5 μέτρο το μέγιστο, όταν έχουμε πολύ ισχυρούς σεισμούς στον ηπειρωτικό χώρο». Για κάθε ρήγμα κατά μήκος του αγωγού εκτιμήθηκαν όλα τα σεισμοτεκτονικά δεδομένα, υπολογίστηκε το μήκος του, το πλάτος της ζώνης, η γωνία κλίσης του, η ολίσθησή του, έτσι ώστε να συναχθούν συμπεράσματα για τη συνολική εικόνα και τον σεισμό που μπορεί να δώσει το καθένα.

«Τα ενεργά ρήγματα της Θεσσαλονίκης»

Το ρήγμα του Ανθεμούντα, όπως και το ρήγμα Πυλαίας-Πανοράματος (Βούλγαρη) είναι εκείνα όπου μία γεωλογική- γεωφυσική έρευνα για την περαιτέρω μελέτη τους κρίνεται επιτακτική, σύμφωνα με τον ομότιμο καθηγητή Γεωλογίας του ΑΠΘ, πρόεδρο της Ελληνικής Γεωλογικής Εταιρείας, Σπύρο Παυλίδη και την δρα Γεωλογίας Άννα Ζερβοπούλου.

Το ρήγμα του Ανθεμούντα είναι το πλέον σημαντικό ενεργό ρήγμα κοντά στην πόλη, που πιθανά συνδέεται με τον σεισμό του 1677 στα Βασιλικά, με εκτιμώμενο μέγεθος 6.2. Στην πραγματικότητα είναι μια ομάδα μικρών ρηγμάτων, με τρία κύρια τμήματα, συνολικού μήκους 32 χιλιομέτρων. Πρόκειται για ρήγμα, το οποίο διέρχεται από δομημένες περιοχές, στις οποίες τα τελευταία χρόνια επεκτείνεται η πόλη της Θεσσαλονίκης, όπως είναι ο Δήμος Θερμαϊκού, στον οποίο πρόσφατα εμφάνισε φαινόμενα «ερπυσμού».

Με γεωλογική τομή στην περιοχή του Γαλαρινού έγινε απόπειρα να προσδιοριστεί ποια κομμάτια του ρήγματος Ανθεμούντα μπορεί να ενεργοποιηθούν μεμονωμένα. Επίσης, στο πλαίσιο της μελέτης για τις ζημιές από την καθίζηση -λόγω υπεράντλησης νερού- κατά μήκος του κυρίως δρόμου που χωρίζει την Άνω και Κάτω Περαία, παρατηρήθηκαν μετατοπίσεις στο ρήγμα, οι οποίες δραστηριοποιήθηκαν από το φαινόμενο της ρευστοποίησης, το οποίο παρατηρείται και στον Κελάριο Κόλπο. Ως αναγκαίες εκτιμώνται και υποθαλάσσιες έρευνες στον κόλπο του Θερμαϊκού, καθώς το ίδιο ρήγμα συνεχίζει μέχρι το Αιγίνιο.

Το ρήγμα Πυλαίας - Πανοράματος στον νεοτεκτονικό χάρτη του ΟΑΣΠ εκτιμήθηκε ως μια σχετικά μικρή γεωλογική δομή, όμως μετά τις έρευνες για την κατασκευή του Μετρό διαπιστώθηκε η προέκτασή του προς την οδό Βούλγαρη και το συνολικό του μήκος υπολογίστηκε σε 10 χιλιόμετρα. Παράλληλα δεν μπορεί να αποκλειστεί η πιθανότητα ο σεισμός του 1759 με μέγεθος 6.5 να συνδέεται με αυτό το ρήγμα.

Το ρήγμα του Ασβεστοχωρίου, λόγω του προσανατολισμού του και της κατευθυντικότητάς του -βορειοδυτικά- δεν κατατάσσεται στα ενεργά και επικίνδυνα ρήγματα, παρόλο που συνδέεται με μικροσεισμικότητα, ενώ το ρήγμα της Ευκαρπίας έχει μικρό μήκος, χωρίς γεωμορφολογικές ενδείξεις ενεργότητας. Σημειώνεται, ωστόσο, πως και τα δύο διασχίζουν κατοικημένες περιοχές και προάστια της πόλης της Θεσσαλονίκης.

«Τα ακίνδυνα ενεργά και τα επικίνδυνα πιθανά ρήγματα»

Οι γεωλόγοι επισημαίνουν πως οι σεισμολόγοι και μηχανικοί μελετούν βασικώς τα δεδομένα για τα ρήγματα που ενεργοποιήθηκαν από πρόσφατους σεισμούς, όμως αυτά μπορεί να καθίστανται πλέον ανενεργά, σε αντίθεση με άλλα που δεν έχουν δώσει σεισμούς εδώ και πάρα πολλά χρόνια και είναι πιο πιθανό να ενεργοποιηθούν. Στην κατεύθυνση να συναχθούν ασφαλέστερα συμπεράσματα ως προς την επαναληψιμότητα της ενεργοποίησης των ρηγμάτων και την εκτίμηση της επικινδυνότητάς τους συμβάλλει η Παλαιοσεισμολογική επιστήμη, που σε αντίθεση με τις ΗΠΑ, την Ιαπωνία κ.λπ. δεν είναι επαρκώς διαδεδομένη στην Ελλάδα και οι λίγες δεκάδες των σχετικών μελετών- παλαιοσεισμολογικών τομών έχουν γίνει σε ακαδημαϊκό επίπεδο -δέκα μελέτες έχουν γίνει από το ΑΠΘ στη λεκάνη της Μυγδονίας.

«Η παλαιοσεισμολογία δεν μπήκε ακόμη στον τεχνικό κόσμο και τους κανονισμούς, παρά το ότι πρόκειται για ένα πολύ σημαντικό εργαλείο και οι παλαιοσεισμολογικές τομές μπορούν να μας δώσουν πάρα πολλές πληροφορίες», παρατήρησε ο κ. Παυλίδης.

Ως χαρακτηριστικό παράδειγμα της σχέσης περιοδικότητας και επικινδυνότητας ενός ρήγματος ο καθηγητής ανέφερε το ρήγμα της Ιερισσού «ένα ρήγμα που δεν το γνωρίζαμε ότι ήταν ενεργό μέχρι που έδωσε τον σεισμό του 1932 -6.9 με 7- αλλά στην πραγματικότητα έδωσε σεισμούς 5.8 , 6 και 6.2 στον Σοχό και έτσι εκτονώθηκε». «Αυτό το ρήγμα αν και θεωρείται βάσει του ορισμού ενεργό», εκτίμησε, «έχει ελάχιστη έως καθόλου πιθανότητα να ενεργοποιηθεί σε μερικές χιλιάδες χρόνια, μπορούμε να το δείξουμε ότι αυτό το ρήγμα είναι ασφαλές», ενώ «το ρήγμα Μπέλες Κερκίνης είναι πιο επικίνδυνο, γιατί πάρα πολλές χιλιάδες χρόνια έχει να ενεργοποιηθεί και είναι παρόμοιο με αυτό του σεισμού στην Κρέσνα».

«Ενεργά ρήγματα στη Θράκη»

Μεταξύ των πιθανών σεισμικών πηγών της Θράκη σημαντικότερο είναι το ρήγμα Ξάνθης-Κομοτηνής, που οριοθετεί τον ορεινό όγκο της Ροδόπης με την πεδιάδα της Κομοτηνής, όπως επίσης το ρήγμα Σαππών και ιδιαίτερα το παράκτιο ρήγμα Μαρώνειας-Μάκρης, το οποίο ανατολικότερα φτάνει μέχρι την Αλεξανδρούπολη, αλλά και το μεγάλο ρήγμα της τάφρου του βορείου Αιγαίου, νότια της Σαμοθράκης, που αποτελεί μια από τις πλέον ενεργές περιοχές του Ελλαδικού χώρου.

Τα ρήγματα Λουτρών και του βόρειου Έβρου, τα οποία δεν έχουν μελετηθεί ικανοποιητικά, αποτελούν εν δυνάμει πιθανές σεισμικές πηγές για το απώτερο μέλλον. Αν και δεν υπάρχουν πολλά επιστημονικά στοιχεία για να τεκμηριώνουν την ενεργό δράση των ρηγμάτων της Θράκης, φαίνεται ότι είναι ρήγματα με πολύ μεγάλη περίοδο επανάληψης σεισμών και για τον λόγο αυτό για μεγάλο χρονικό διάστημα παραμένουν αδρανή.

Το βόρειο Αιγαίο και ιδιαίτερα η «Τάφρος» διασχίζεται από ρήγματα, τα οποία έχουν δυναμικό για ισχυρότατους σεισμούς. Το ευτύχημα, σύμφωνα με τον κ. Παυλίδη, είναι ότι οι περισσότεροι είναι υποθαλάσσιοι μακριά από κατοικημένες περιοχές χωρίς συνέπειες. Στη βορειοδυτική Ελλάδα κυριότερα ρήγματα είναι αυτά στη λεκάνη της Πτολεμαΐδας.

Το τμήμα Γεωλογίας του ΑΠΘ έχει αναπτύξει την Ελληνική Βάση Δεδομένων Ενεργών Ρηγμάτων (Greek Database of Seismogenic Sources- GreDaSS), στο πλαίσιο του Ευρωπαϊκού Ερευνητικού Προγράμματος Seismic Hazard Harmonization in Europe (SHARE) και σε συνεργασία με το Istituto Nazionale di Geofisica e Volcanologia di Roma (INGV) και το Πανεπιστήμιο της Ferrara. Στόχος της έρευνας ήταν να δημιουργήσει μία πολυεπίπεδη γεωγραφική βάση δεδομένων ενεργών ρηγμάτων όσο το δυνατόν πληρέστερη για τον ευρύτερο χώρο του Αιγαίου. Η Βάση Δεδομένων είναι προσβάσιμη στην ιστοσελίδα της ερευνητικής ομάδας Γεωλογίας των Σεισμών του ΑΠΘ http://eqgeogr.weebly.com/. «Εκτιμούμε ότι μια τέτοια εργασία αποτελεί σημαντική προσφορά των γεωεπιστημών της τομείς της Γεωλογικής Χαρτογράφησης, Σεισμοτεκτονικής και Αντισεισμικής προστασίας, η οποία σε μια ευνομούμενη πολιτεία θα πρέπει να μετεξελιχτεί ως έργο προτεραιότητας σε Εθνική Βάση», ανέφερε ο κ. Παυλίδης.

(Πηγή: ΑΠΕ-ΜΠΕ)

(Η ΚΑΘΗΜΕΡΙΝΗ, Τετάρτη 28 Νοεμβρίου 2018, http://www.kathimerini.gr/997371/gallery/epikairothta/ellada/axartografhta-rhgmata-sth-v-ellada-apotypwse-h-gewlogikh-meleth-gia-ton-tap)

ΕΝΔΙΑΦΕΡΟΝΤΑ - ΛΟΙΠΑ

10 Things That Require ZERO Talent

How often do we equate success with talent? All the time. But the reality is, success isn't created by talent alone. Just like we might see immense talent squandered, we also see underdogs unexpectedly overachieve. Here are 10 behaviors that we can always control that require zero talent yet have a huge impact on our success.

1. Being on time. Punctuality is a keystone habit that requires organization and planning ahead—both of which lead to greater success. Here's a good primer on why being on time is important and how anyone can make it a habit.

2. Work ethic. This is the discipline of showing up consistently and making the best decisions that lead to peak performance. Even at the pinnacle of his career, basketball superstar Kobe Bryant's work ethic was legendary. Kevin Durant recalls the message a veteran Kobe sent the younger players at Olympic Trials back in 2008, just after Durant's first year in the league. The players were given a day off, but there was Kobe, the only veteran getting on the bus to go work out at a high school gym. "He made 50 shots at each spot around the 3-point line," Durant recalls. "We just looked down there and said, man, he's the best player in the league and he took a bus to a high school to get some work in. It's that work ethic that Kobe embraced throughout his career to become one of the all-time greats. As Kobe said after getting drafted straight out of high school in 1996, "I don't want (fans) to think I'm just a high school kid coming in here thinking the world owes me something. I'm going to go out there and I'm going to work."

3. Effort. Few athletes worked as hard as major league pitcher John Smoltz, who is now in the Baseball Hall of Fame. As his agent, I saw him extend his career by years through sheer effort and commitment. He made up his mind to make changes along the way, like going from starter to closer, that kept him in the game as a valuable contributor to his team. Effort is a mindset as much as it is a behavior.

4. Body language. How you move and express yourself around others shapes who you are and how you are perceived. Anyone can improve, and here's a TED talk that explains why and how.

5. Energy. Everyone has energy to devote to a goal, and the decision of how much to give. Be conscious about where yours goes.

6. Attitude. It's up to you to keep going. No one else can decide that. A great attitude maximizes the talent that you do have and offsets what you lack.

7. Passion. Perhaps the single most important way each one of us can suffocate the fear that keeps us from peak performance.

8. Being coachable. Anyone can become a better listener, learn from feedback, and embrace the success of others.

9. Doing extra. Go the extra mile. I saw it all the time with the athletes I worked with. The ones who sustained their success were the ones who consistently worked at their craft beyond what was required. That extra work and preparation fosters confidence. We can all learn from this approach and exceed our own expectations.

10. Being prepared. Only you can give yourself the time and space to be as ready as you can be. Make it a habit, and you will make the most of your talent. There is great truth in the saying: Failing to prepare is preparing to fail.

Your Game Changer Takeaway

Remember that talent is never enough. The best of the best don't rest on what they were born with—they dig down to get the most they can. Try these 10 things (or just one!) and over time it will pay off.

(Molly Fletcher, Published on October 4, 2016, https://www.linkedin.com/pulse/10-things-require-zero-talent-molly-fletcher/)

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'Hologram' lecturers to teach students at Imperial College London

University classes are set to be given a futuristic spin by letting lecturers appear as hologram-like apparitions beamed in from afar.

Imperial College London will show off the technology at a special event later on Thursday before deploying it more widely.

It believes it will be the first academic body to do so regularly.

A similar effect has been used to animate images of Michael Jackson, Elvis Presley and other celebrities.

The technology will be used to beam in speakers from New York and Los Angeles

Imperial will initially limit its use to its Business School's ac-

tivities but expects the technology could eventually become common.

"The alternative is to use video-conferencing software but we believe these holograms have a much greater sense of presence," Dr David Lefevre, director of Imperial's Edtech Lab, told the BBC.

"The lecturers have a high-definition monitor in front of them which is calibrated so they can point at people and look them in the eye. They can really interact."

More than one person can also appear at a time.

Indeed, at the Women in Tech event on Thursday, a panel will feature two guests whose images will be transmitted from the US alongside a further two actually on stage. All four are expected to be able to intercommunicate.

On budget

Strictly speaking, the illusions are not holograms but neither are **they the Pepper's Ghost effect** used by politicians including French presidential candidate Jean-Luc Melenchon and India's Prime Minister Narendra Modi as well the entertainment industry.

Watch video: Jean-Luc Melenchon used the Pepper's Ghost illusion to appear at seven places at once in 2017

Instead, they use a technique developed by a Canadian company, Arht Media.

"The problem with Pepper's Ghost is that it can be intricate to set up and can cost about £150,000 to run an event," said Dr Lefevre.

"This is simpler - you project upon a glass screen, and a backdrop behind it uses software to give it an illusion of depth.

"It runs at the low thousands each time, so for the first time universities can afford it."

To send their image, lecturers need to use a "capture studio", which involves filming them against a black backdrop while being lit from both sides.

Imperial plans to make use of two external studios - one in Los Angeles, the other Toronto - as well a portable kit to invite overseas-based guest speakers to give talks to its students.

In addition, it intends to use the equipment to let one of its lecturers give a presentation to a Spanish business school in February.

Beyond providing a less disruptive means of attracting foreign talent than flying them in, Imperial says there are other advantages.

A popular invitee can be beamed to several lecture halls simultaneously.

Talks can also be recorded and played back for later use, although this would rule out interactions with the audience.

Imperial can deploy a portable studio to invite speakers from across the world

The downside is there is less likelihood guests will stay around for a chat once their scheduled appearance ends. Plus there is always the risk of a technical hitch.

But Imperial believes the benefits should outweigh the drawbacks.

"It's going to be one of those technologies that gets used," Dr Lefevre said.

"So long as the technology works the way we believe it will, I can see this becoming fairly mainstream."

(Leo KelionTechnology desk editor / BBC News, 1 November 2018, https://www.bbc.com/news/technology-46060381)

Το Facebook έβαλε τα «Αρχαία Ελληνικά» στην επιλογή γλώσσας

Το γνωρίζουν ελάχιστοι, ωστόσο αποτελεί πραγματικότητα. Το Facebook στις επιλογές της γλώσσας έχει εντάξει και τα Αρχαία Ελληνικά.

Πλέον οι λάτρεις της Αρχαίας ελληνικής γλώσσας μπορούν να διαβάζουν τα μηνύματά τους ως «Αγγέλματα». Στη θέση του «Τι σκέφτεστε» να αναφέρει «Τί δοκείς», ενώ όταν κάποιος επιθυμεί να σχολιάσει μια φωτογραφία, να βλέπει την ένδειξη: Σχόλιον γράφειν

Πώς… γυρνάει το Facebook στην αρχαία ελληνική γλώσσα:

1. Μεταβείτε στις «Ρυθμίσεις».

2. Επιλέξετε τη «Γλώσσα».

3. Αναζητήστε την επιλογή «Ελληνική αρχαία» και πατήστε «Αποθήκευση αλλαγών»!

(2 Νοεμβρίου 2018, https://www.newsone.gr/paraxena/apistefto-to-facebook-evale-ta-archea-ellinika-stin-epilogi-glossas-dite-pos-energopiounte/)

Quantum 'compass' could allow navigation without relying on satellites

The UK's first quantum accelerometer for navigation has been demonstrated by a team from Imperial College London and M Squared.

A video explaining the technology and looking behind the scenes can be found at:

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

Most navigation today relies on a global navigation satellite system (GNSS), such as GPS, which sends and receives signals from satellites orbiting the Earth. The quantum accelerometer is a self-contained system that does not rely on any external signals.

This is particularly important because satellite signals can become unavailable due to blockages such as tall buildings, or can be jammed, imitated or denied – preventing accurate navigation. One day of denial of the satellite service would cost the UK £1 billion.

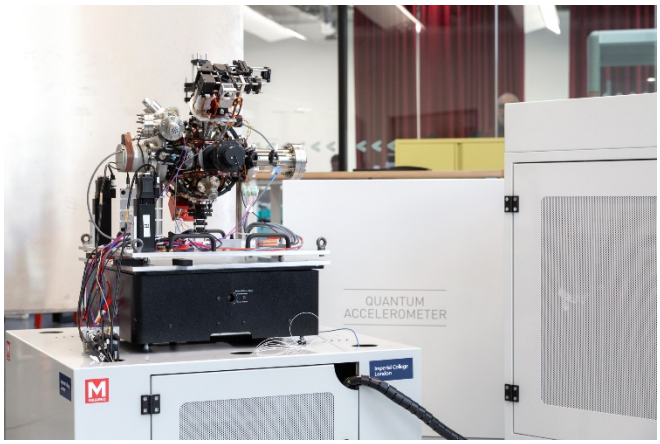
Now, for the first time, a UK team has demonstrated a transportable, standalone quantum accelerometer at the National Quantum Technologies Showcase, an event demonstrating the technological progress arising from the UK National Quantum Technologies Programme – a £270m UK Government investment over five years.

The device, built by Imperial College London and M Squared, was funded through the Defence Science and Technology Laboratory's Future Sensing and Situational Awareness Programme, the Engineering and Physical Sciences Research Council, and Innovate UK. It represents the UK's first commercially viable quantum accelerometer, which could be used for navigation.

Accelerometers measure how an object's velocity changes over time. With this, and the starting point of the object, the new position can be calculated.

Using the precision of ultra-cold atoms

Accelerometers have existed for some time, and are present today in technologies like mobile phones and laptops. However, these devices cannot maintain their accuracy over longer periods without an external reference.



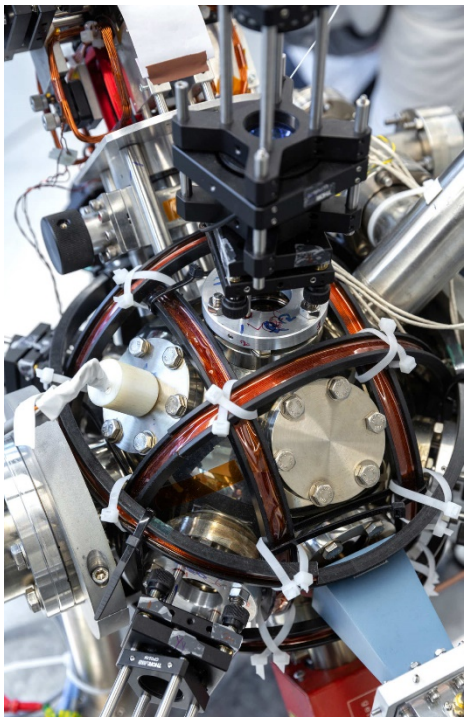
The quantum accelerometer relies on the precision and accuracy possible by measuring properties of supercool atoms. At extremely low temperatures, the atoms behave in a 'quantum' way, acting like both matter and waves.

As the atoms fall, their wave properties are affected by the acceleration of the vehicle. Using an 'optical ruler', the accelerometer is able to measure these minute changes very accurately.

To make the atoms cold enough, and to probe their properties as they respond to acceleration, very powerful lasers that can be precisely controlled are needed.

Putting the UK at the heart of the coming quantum age

Dr Joseph Thom, Quantum Technology Scientist at M Squared, said: "As part of our work in commercialising cold atom quantum sensors, we developed a universal laser system for cold atom-based sensors that we have already implemented in our quantum gravimeter. This laser is now also used in the quantum accelerometer we have built in collaboration with Imperial. Combining high power, exceptionally low noise and frequency tunability, the laser system cools the atoms and provides the optical ruler for the acceleration measurements."



Close-up of the accelerometer

The current system is designed for navigation of large vehicles, such as ships and even trains. However, the principle can also be used for fundamental science research, such as in the search for dark energy and gravitational waves, which the Imperial team are also working on.

Professor Ed Hinds, from the Centre for Cold Matter at Imperial, said: "I think it's tremendously exciting that this quantum technology is now moving out of the basic science lab and being applied to problems in the wider world, all from the fantastic sensitivity and reliability that you can only get from these quantum systems."

Dr Graeme Malcolm, founder and CEO of M Squared, said: "This commercially viable quantum device, the accelerometer, will put the UK at the heart of the coming quantum age. The collaborative efforts to realise the potential of quantum navigation illustrate Britain's unique strength in bringing together industry and academia – building on advancements at

the frontier of science, out of the laboratory to create real-world applications for the betterment of society."

See the press release of this article

(Hayley Dunning, Thomas Angus, Mr Martin Sayers, 09 November 2018, https://www.imperial.ac.uk/news/188973/quantum-compass-could-allow-navigation-without/)

Ιστορική αποκαθήλωση για το μοναδικό «αληθινό» κιλό στον κόσμο

Το Πρωτότυπο Κιλό

Ήρθε η ώρα για άλλη μια ιστορική αποκαθήλωση. Το «αληθινό» κιλό, ένας κύλινδρος από κράμα πλατίνας και ιριδίου, που εδώ και 130 χρόνια αποτελεί το παγκόσμιο πρότυπο για τη μέτρηση της μάζας, θα πάψει πια να αποτελεί το σημείο αναφοράς.

Οι αντιπρόσωποι από τα 60 κράτη μέλη του Διεθνούς Γραφείου Μέτρων και Σταθμών (BIPM), μεταξύ των οποίων και η Ελλάδα, συνέρχονται αυτή την εβδομάδα στις Βερσαλίες της Γαλλίας, στο πλαίσιο της 26ης Γενικής Συνδιάσκεψης για τα Μέτρα και τα Σταθμά (CGPM) και αναμένεται να ψηφίσουν στις 16 Νοεμβρίου, προκειμένου να αναθεωρήσουν ξανά το Διεθνές Σύστημα Μονάδων (SI).

Η αναθεώρηση έχει ως στόχο τέσσερις από τις βασικές μονάδες του συστήματος -το χιλιόγραμμο ή κιλό (μονάδα μέτρησης της μάζας), το αμπέρ (μονάδα μέτρησης της έντασης του ηλεκτρικού ρεύματος), το κέλβιν (μονάδα μέτρησης της θερμοκρασίας) και το γραμμομόριο (μονάδα μέτρησης για την ποσότητα ύλης ενός σώματος)- έτσι ώστε να ορίζονται πλέον έμμεσα, με όρους κάποιας φυσικής σταθεράς.

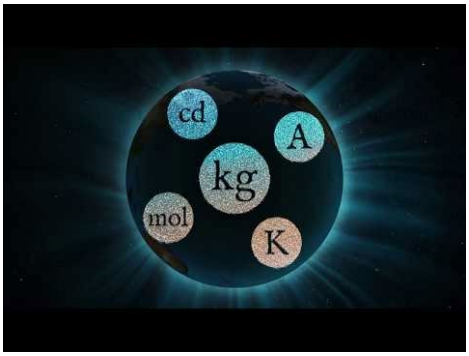
Συγκεκριμένα, το κιλό θα ορίζεται πλέον με βάση τη Σταθερά Πλανκ (έναν αριθμό που σχετίζεται με τον κβαντικό κόσμο και δεν αλλάζει ποτέ), το αμπέρ με βάση το φορτίο του ηλεκτρονίου, το κέλβιν με βάση τη Σταθερά Μπόλτζμαν και το γραμμομόριο με βάση τη Σταθερά Αβογκάντρο. Είχε προηγηθεί τα προηγούμενα χρόνια μια ανάλογη αναθεώρηση για τις άλλες τρεις βασικές μονάδες του συστήματος SI: το μέτρο (μονάδα μέτρησης της απόστασης), το δευτερόλεπτο (μονάδα μέτρησης του χρόνου) και το κηρίο ή καντέλα (μονάδα μέτρησης της έντασης μιας φωτεινής πηγής).

Μέχρι σήμερα το πρότυπο του κιλού, το λεγόμενο και μόνο «αληθινό» κιλό ή «Το Μεγάλο Κ» (Le Grand K), που χρησιμοποιείται από το 1889, φυλάσσεται σε ένα εργαστήριο στο κτίριο του Διεθνούς Γραφείου Μέτρων και Σταθμών (το οποίο είχε ιδρυθεί το 1875), στις Σέβρες της Γαλλίας. Ο εν λόγω εμβληματικός λαμπερός κύλινδρος -που διεκδικεί το δικαίωμα να αποκαλείται το μοναδικό αληθινό κιλό στον κόσμο- αποτελεί το τελευταίο υλικό κατασκεύασμα που ακόμη χρησιμοποιείται για τον ορισμό μιας μονάδας του συστήματος SI.

Η αναμενόμενη αναθεώρηση έχει ως στόχο να κάνει τις μονάδες μέτρησης πιο σταθερές και αξιόπιστες σε βάθος χρόνου, συνδέοντας τις μετρήσεις στο μικροσκοπικό επίπεδο (ατομικό και κβαντικό) με τις μετρήσεις στο μακροσκοπικό επίπεδο.

Μια σημαντική αλλαγή είχε γίνει το 1983, όταν η 17η CGPM όρισε με ακρίβεια την ταχύτητα του φωτός σε 299.792.458 μέτρα ανά δευτερόλεπτο. Αμέσως μετά, το μέτρο (που αρχικά είχε ορισθεί ως το ένα δεκάκις εκατομμυριοστό της απόστασης από το Βόρειο Πόλο ως τον Ισημερινό) ορίστηκε πλέον σε σχέση με αυτή τη φυσική σταθερά του σύμπαντος, ως η απόσταση που το φως ταξιδεύει σε 1/299.792.458 δευτερόλεπτα.

Ορισμένοι φυσικοί, ειδικοί στη μετρολογία, φοβούνται ότι οι νέοι πολύπλοκοι ορισμοί θα φαίνονται σαν κινέζικα σε όποιον δεν έχει διδακτορικό στη φυσική, ενώ κάποιοι διαμαρτύρονται ότι το νέο σύστημα SI ουσιαστικά δεν θα έχει πια καμία σχέση με μέτρα και σταθμά. Εφόσον πάντως το νέο σύστημα εγκριθεί ομόφωνα δια ψηφοφορίας στο τέλος της εβδομάδας, θα τεθεί σε ισχύ στις 20 Μαΐου του 2019.



https://www.youtube.com/watch?v=MUJX1Yyx6TI

Στο μέλλον αναμένεται μια ακόμη αναθεώρηση του ορισμού του δευτερολέπτου, το οποίο είχε ορισθεί εκ νέου το 1967 ως «ατομικό δευτερόλεπτο», με βάση τις ταλαντώσεις της ακτινοβολίας μικροκυμάτων από το άτομο του καισίου-133. Καθώς όμως πλέον κατασκευάζονται ολοένα πιο ακριβή ατομικά ρολόγια, μέχρι το 2030 εκτιμάται ότι θα έχει αλλάξει ξανά ο ορισμός του.

Όσο για το «Μεγάλο Κιλό», το Διεθνές Γραφείο Μέτρων και Σταθμών δεν θα το πετάξει στα σκουπίδια, αλλά θα το φυλάξει και κατά καιρούς θα το «καλιμπράρει» ως δευτερεύον πρότυπο της μάζας. Και βέβαια, ο απλός άνθρωπος δεν θα καταλάβει την αλλαγή. Τίποτε δεν θα αλλάξει στον τρόπο που ζυγίζονται οι πατάτες του στο μανάβικο!

Η ψηφοφορία για την αναθεώρηση του συστήματος SI θα μεταδοθεί ζωντανά το μεσημέρι της Παρασκευής στο YouTube.

(Newsit Newsroom, 12.11.2018, Πηγή: ΑΠΕ – ΜΠΕ, https://www.newsit.gr/kosmos/istoriki-apokathilosi-gia-to-monadiko-alithino-kilo-ston-kosmo/2656793/)

536 Was a Garbage Year for Mankind (So Give 2018 a Break)

The fall of the Roman Empire may have been a partial result of the decade of famine and plague that began in A.D. 536, the authors of a new study say.

In A.D. 536, Europe had a terrible, horrible, no-good, very bad year.

It started when a mysterious fog swept over the continent, veiling the sun in a blue haze and casting Europe, the Middle East and parts of Asia into darkness 24 hours a day, for 18 months. Falling temperatures ushered in the coldest decade of the past 2,000 years, crops failed from Ireland to China, and famine ran rampant. Those who endured the long, cold night faced even harsher times in the years to come; in A.D. 541, an outbreak of bubonic plague known as Justinian's Plague scythed through the Mediterranean, killing up to 100 million people.

This series of events was, to put it in scientific terms, a total bummer. Michael McCormick, a medieval historian and archaeologist, recently told Science magazine that the year 536 was "the beginning of one of the worst periods to be alive, if not the worst year." But despite all that is known about the devastation that began then, scientists still aren't sure exactly what caused the mystery cloud of doom to descend over Europe in the first place.

Now, McCormick and his colleagues from the U.S., the U.K. and Germany believe they've finally uncovered the answer. In a new study published this week (Nov. 14) in the journal Antiquity, the team analyzed an ancient ice core pulled from the Swiss Alps containing more than 2,000 years' worth of microscopic history lessons. Particles of dust, metal and airborne elements frozen at various levels of the 235-foot-long (72 meters) core hint at how the atmosphere over Europe changed throughout the past two millennia — a Saharan dust storm here, a silver-mining boom there — and, according to the new study, reveal that a massive volcanic eruption in Iceland directly preceded the beginning of Europe's darkest days.

The new study picks up on previous research by several of the paper's co-authors, who in 2015 used a laser to cut ultra-thin slices of the Alpine ice core for chemical analysis. Using this method, the scientists took tens of thousands of core samples, each one representing just a few days or weeks of snowfall throughout history and analyzed the specific atmospheric elements that had been trapped there.

When looking at samples dated to the spring of 536, the team found two microscopic shards of volcanic glass, which were later traced to volcanic rocks from Iceland. According to the researchers, these well-traveled shards are evidence of a massive volcanic eruption that spewed a monstrous plume of ash into the air over the Northern Hemisphere, riding the winds south to Europe and engulfing the sky for more than a year.

While previous research has suggested that a volcanic eruption in what is now the Western United States may have been the cause of Europe's dark days, study co-author Christopher Loveluck, an archaeologist at the University of Nottingham in the U.K., said the Iceland hypothesis is more consistent with the devastation described in historical records.

"Iceland is a lot closer to Britain and Northwest Europe than California, which means that the impact of this eruption at the time on climate in these areas would have been much greater than previously thought," Loveluck said in a statement. "It would have made places very cold very quickly and would have been most felt in Britain and places in Northwestern Europe. The consequences for these areas would have been immediate, with an increased likelihood of famine and ill health due to poor crop yields."

The team also found evidence of two subsequent eruption events in the years 540 and 547. According to the researchers, the combined pollution from this volcanic triple-whammy did more than just block the sun and cool Earth — it may well have set Europe up for a period of death and decline that lasted 100 years.

Luckily, Europe's string of terrible, horrible, no-good, very bad days eventually passed. By the year 640, samples from the Alpine ice core showed signs of a new kind of airborne pollution: lead, released into the sky during a silver-smelting boom. According to Loveluck, a renewed demand for silver represented an economy rebounding in the darkness of starving, disease-stricken Europe, and the emergence of a new merchant class ready to trade in precious metals.

(Brandon Specktor, Senior Writer / LICESCIENCE, November 20, 2018, https://www.livescience.com/64132-worst-year-ever-536.html?utm_source=ls-newsletter&utm_medium=email&utm_campaign=20181120-ls)

Why 536 was 'the worst year to be alive'

An 72-meter ice core drilled in the Colle Gnifetti Glacier in the Swiss Alps entombs more than 2000 years of fallout from volcanoes, storms, and human pollution.

Ask medieval historian Michael McCormick what year was the worst to be alive, and he's got an answer: "536." Not 1349, when the Black Death wiped out half of Europe. Not 1918, when the flu killed 50 million to 100 million people, mostly young adults. But 536. In Europe, "It was the beginning of one of the worst periods to be alive, if not the worst year," says McCormick, a historian and archaeologist who chairs the

Harvard University Initiative for the Science of the Human Past.

…

(Ann Gibbons / SCIENCE, Nov. 15, 2018, https://www.sciencemag.org/news/2018/11/why-536-was-worst-year-be-alive?utm_campaign=news_daily_2018-11-15&et_rid=377269358&et_cid=2490907)

Nature Creates the Most Beautiful Geometry…

Dahlia

Spiraling Succulent

Hoya Aldrichii

Aloe Polyphylla

Romanesco Broccoli

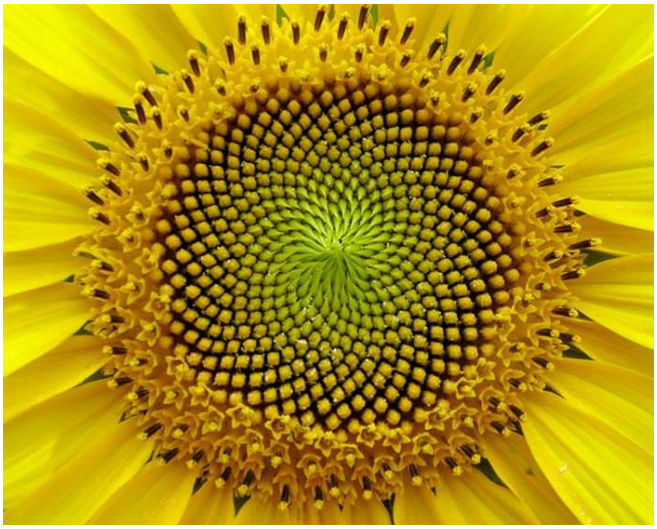
Crassula Buddha's Temple Plant

Amazon Lily Pad

Fractal Cabbage

A Jeweled Carpet...

Sunflower



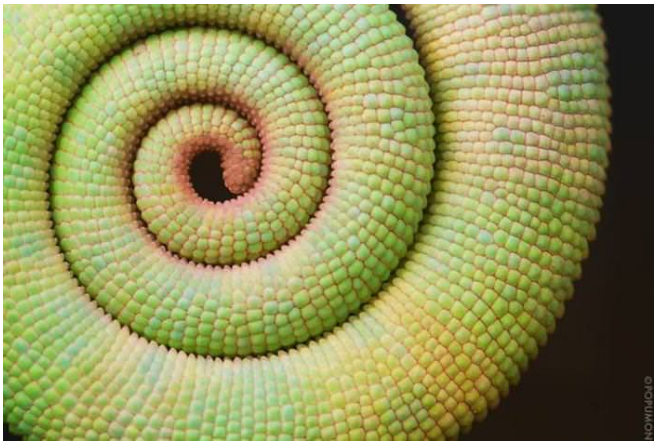
Drosophyllum Lusitanicum

The Thinking Cactus

Camelia

Viola Sacculus

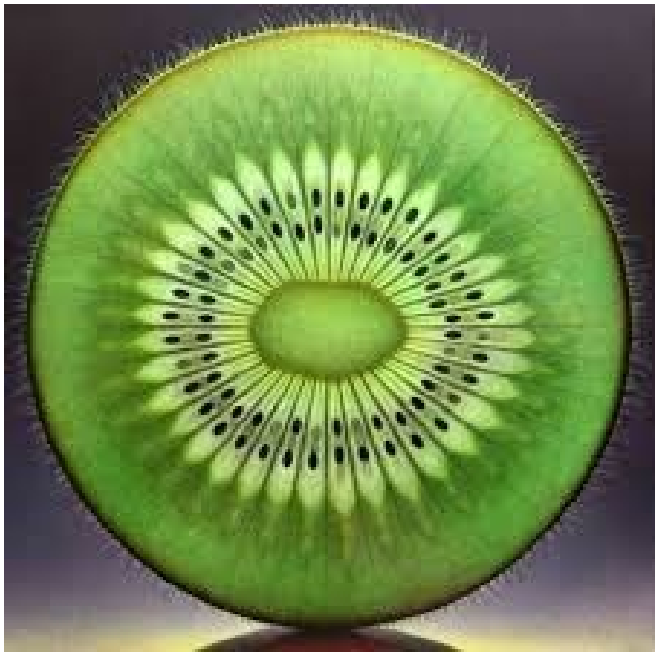
Chameleon Tail



Hoya kerrii

Leaf Ladder

Kiwi



Passiflora Caerulea

Spiral Begonia

Hoya Pubicalyx

ΝΕΕΣ ΕΚΔΟΣΕΙΣ ΣΤΙΣ ΓΕΩΤΕΧΝΙΚΕΣ ΕΠΙΣΤΗΜΕΣ

Guideline For Good Practice Of Fibre Reinforced Precast Segment - Vol. 2 : Production Aspects

ITAtech Activity Group Support

When producing Volume 1 of this guidance document the authors decided to initially focus on the design aspects of fibre reinforced concrete segmental tunnel linings, recognising that both segment design and production constitute equally important aspects for the success of tunnels lined with precast fibre reinforced concrete segments. Volume 2 therefore concentrates on the production of segments and the associated quality control. The advantages of using Fibre Reinforced Concrete for segments are particularly eminent in the production phase, as the absence or reduction of bar reinforcement typically results in program and cost savings, and in the reduction of risk associated with the manufacture and installation of reinforcement cages. As in Volume 1, the aim of this document is to present the common understanding of designers, manufacturers and users of fibre reinforced concrete segments of what constitutes good practice in this field of engineering. The document should be read in combination with Volume 1, which contains useful information on elementary properties of fibre reinforced concrete. ITAtech and the sub activity group welcomes all feedback on this document and will incorporate the user experience with the document in the course of future new editions.

(ITAtech AG PFRCS, 2018)

ΗΛΕΚΤΡΟΝΙΚΑ ΠΕΡΙΟΔΙΚΑ

www.geoengineer.org

Κυκλοφόρησε το Τεύχος #156 του **Newsletter** του **Geo-engineer.org** (Ιουνίου 2018) με πολλές χρήσιμες πληροφορίες για όλα τα θέματα της γεωμηχανικής. Υπενθυμίζεται ότι το Newsletter εκδίδεται από τον συνάδελφο και μέλος της ΕΕΕΕΓΜ Δημήτρη Ζέκκο.
(https://www.geoengineer.org/geonews156.html).

Ενδεικτικά αναφέρονται:

- Citizen scientists at NASA's service, for the creation of the largest landslide database
- How does the Leaning Tower of Pisa survive earthquakes
- Static Load Testing by GRL
- NASA plans to transfer rock and soil samples from Mars to Earth
- Nuclear tests in North Korea caused mountain deformation and possible radiation leakage
- Hawaii's Big Island: The opening of 3 new fissures raises fears for an 'explosive eruption'
- An enormous sinkhole opened up in New Zealand, revealing an ancient volcano underneath
- Don't Let Your Rock Strength Results Come Up Short Specimen Preparation is Key
- Elizabeth line: The new crossrail of London
- Tunnel becomes safe with the usage of Polystyrene blocks
- Hawaii's Big Island: Volcanic activity provokes another threat
- ''Snowball Earth'' triggered by the advent of plate tectonics?

Τεύχος #157 του **Newsletter** του **Geo-engineer.org** (Ιουλίου 2018).
(https://www.geoengineer.org/geonews157.html).

Ενδεικτικά αναφέρονται:

- East Antarctic Ice Sheet retreated little during past 8 million years
- Increased seismic hazard due to Earth's rotation slowdown
- Generate charts with historical Geotechnical Business Confidence Index data for each country!
- Cracks open in Hawaii and threaten local house
- Geoengineers to enhance offshore development capabilities
- Lebanon's mountains are being wiped out
- Possible tsunami threat in the Caribbean
- Is Africa gradually splitting into two sections?
- What is the limit of geoengineering in climate change?
- Moon is making the days on Earth longer
- Melbourne's TBMs almost ready to advance
- Organic matter found on Mars by Nasa's rover
- Landslide threatens the stability of Lake Tahoma dam, North Carolina
- Guatemala volcano eruption: 25 people killed and hundreds injured
- ''Snowball Earth'' triggered by the advent of plate tectonics?

Τεύχος #158 του **Newsletter** του **Geo-engineer.org** (Αυγούστου 2018).
(https://www.geoengineer.org/geonews158.html).

Ενδεικτικά αναφέρονται:

- The major role of Geology on the D-Day Landing in Normandy
- Savings in removing over repairing dams
- Top Geotechnical Journal Paper Award
- Landslide at Myanmar jade mine: 15 killed and 45 injured
- Indonesia 6,9 Mw earthquake: At least 98 dead, thousands homeless
- New efficient laboratory test to determine soil productivity
- Fatal landslide in Afghanistan destroys 300 houses-Search for survivors
- California Highway 1 re-opens a year after landslide
- Block caving: A new mining method arises
- Wall collapses in Mumbai: At least 6 cars buried

Τεύχος #159 του **Newsletter** του **Geo-engineer.org** (Σεπτεμβρίου 2018).
(https://www.geoengineer.org/geonews159.html).

Ενδεικτικά αναφέρονται:

- Earthquake magnitude can be mitigated due to ground water pressure
- Large sinkhole opens in Pennsylvania: 6 cars buried
- Earthquakes can trigger seismic events on the opposite side of Earth
- Major earthquake on Peru-Brazil border
- Two massive earthquakes struck Indonesia in five minutes
- Hawaii's underground wastewater project
- Myanmar dam failure: 85 villages flooded
- Real time warning system for landslides
- Massive mudslide eruption in Swiss village
- Landslides induced by human activity are rising

International Journal of Geoengineering Case Histories

Volume 4 Issue 4

www.geocasehistoriesjournal.org/pub/issue/view/42

This special Issue is a collection of some of the top papers submitted to the 1st International Conference on Natural Hazards and Infrastructure (ICONHIC2016) which took place in Chania, Greece from 28-30 June 2016.

Editorial, George Gazetas, Rallis Kourkoulis

Numerical Modelling for Coastal Structures Design and Planning. A Case Study of the Venetian Harbour of Chania, Greece, Spyros Foteinis, Theocharis Tsoutsos, Costas Synolakis

Flooding Vulnerability Lessons Learned in Assessing the Effects of Flooding Caused by the Canterbury Earthquake Sequence, Mark C. N. Taylor, T. S. R. Fisher, K. K. S. Ng, M. Pennington

Lessons Learned from the Application of UAV-Enabled Structure-From-Motion Photogrammetry in Geotechnical Engineering, Dimitrios Zekkos, William Greenwood, Jerome Lynch, John Manousakis, Adda Athanasopoulos-Zekkos, Marin Clark, Kristen L. Cook, Charalampos Saroglou

Minimum Uplift Horizontal Acceleration of the Single-Nave Barrel Vault and the Rocking Frame, Haris Alexakis, Nicos Makris

Frequency Based Design of KDamper for Seismic Isolation of a Single Pier Concrete Bridge, Evangelos Sapountzakis, Panagiota Syrimi, Ioannis Antoniadis

Development of RApid REsponse (RARE) System for Motorway Bridges: Overview and Pilot Application to Attiki Odos Motorway, Ioannis Anastasopoulos, Panagiotis Anastasopoulos, Lampros Sakellariadis, Athanasios Agalianos, Rallis Kourkoulis, Fani Gelagoti, George Gazetas

GeoWorld

GEO-TRENDS REVIEW

https://www.mygeoworld.com/geotrends/issues/5-november-2018

We are pleased to announce the publication of the 5th issue of the Geo-Trends Review Magazine! The first crowdsourcing-based content magazine in Geotechnical Engineering!

- You can now listen to a 25 minutes recording of Prof. Terzaghi last lecture in Harvard!
- Announcing the Geotechnical Job Openings Section on GeoWorld
- Issue #4 of Volume #4 of the IJGCH released
- Proceedings from 26th European Young Geotechnical Engineers Conference (Graz, Austria 2018) available in open access!
- Geotechnical Business Confidence Index 2018/Q3 results are out! Participate to influence 2018 4th quarter results!
- European Bright Spark Lecture
- TBM breaks through hard granitic rock on Atlanta water tunnel
- Michigan Engineering: Pursue Bold Ideas
- Invitation for paper on "Climate Change and Geotechnical Engineering" to be published in Environmental Geotechnics in 2019.
- Case-study webinar by Prof. Carlo Viggiani (October 2018)
- Geopier Foundations Announces New Vice President of Operations
- Determine shear strength values of cohesive soils with Humboldt's pocket shear vane Tester.
- Questions about GeoWall loading frame

International Geosynthetics Society

IGS NEWSLETTER – NOVEMBER 2018

Helping the world understand the appropriate value and use of geosynthetics

Dear IGS News Readers

The ***IGS News*** was established in June 1985 with 8 pages and reached a maximum of more than 60 pages in the last years. But not only the amount of information changed within the years, but also the type of publication is changing. It started with printed matters and postal send outs and it was changed to digital distribution of PDFs for reading online or printing by oneselves and meanwhile searchable and indexed PDFs. But this is not the end, as modern online formats allow much more possibilities to increases the contact within a learned society like IGS as well.

The new term of the IGS Council started in September 2018 with a new set of IGS Officers following the outstanding 11ICG in Seoul. The discussions and decisions of the new IGS Council led to a new focus for the IGS News: The publishing of 3 issues a years as a PDF seems to be out dated and the already installed system of bringing the news directly to the website of IGS is the more prompt way to keep in touch with the members of IGS and all other interested parties.

Therefore in the future the printed versions (PDF) will be cancelled and for archive purposes all news will be collected in one file at the end of the year.

The news will go through the IGS News Editor for review and then to the IGS Secretariat for the posting to the webpage where they are immediately available for the public. To keep the members informed about the available news there will be an email sent out by the IGS Secretariat on a monthly basis (like it was until now for the IGS News issues) with headlines and direct links to the articles. You receive this one here for the first time highlighting the events of the 11ICG!

The IGS News Correspondent and all interested members of IGS are invited to send in articles at any time as this is no longer restricted to any publishing deadlines. Please use this opportunity to help us to achieve a more lively and prompt exchange within the IGS community.

We are looking forward to a fruitful future of exchange of knowledge and information within our community and the "World Wide Web"-based interested parties!

Many thanks for your support,

Gerhard Bräu

Editor, IGS News

Message From The President

Introducing Chungsik Yoo, Ph.D.

Dear IGS Colleagues, I am truly humbled, delighted and privileged to assume the role of President of the IGS for the next four years (2018-2022). It is my greatest honor to have earned your support

READ MORE

Seoul Shines and 11 ICG Proves to Be a Tremendous Success

The Korean Geosynthetics Society (KGSS) and IGS Korea produced a wildly successful conference and exhibition. Importantly, the conference was truly global in its scope. The numbers alone tell a compelling, international story for the geosynthetics field.

READ MORE

Introducing the 18th IGS Council

At the recent 11th International Conference on Geosynthetics (11th ICG) held in Seoul, Korea the IGS Council marked the beginning of a new Council term. At the General Assembly the officers and council members elected to serve for the 2018-2022 term were announced and officially took office.

READ MORE

IGS Awards 2014-2017

Original thinking and hard work characterized the IGS Award-winning projects at 11ICG held in Seoul, Korea. The IGS Awards were presented during the General Assembly held on 20 September 2018.

READ MORE

IGS Announces Honourary Member and Service Awards Presented in 2018

This year at 11ICG, the IGS recognized several of its members for commitment and dedication to the IGS and the greater good of the geosynthetics discipline.

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***Geotextiles and Geomembranes*:**

Best papers in 2017

This year the Editorial Board selected the "Best Paper" published in *Geotextiles and Geomembranes* in 2017.

READ MORE

Best *Geosynthetics International* Paper for 2017

We are delighted to announce the best paper in *Geosynthetics International* journal volume 24 (2017) based on votes cast by the Editorial Board Members.

READ MORE

Presenting the Inaugural IGS Young Members Committee Photo Contest Winner

The Young Members Committee of the IGS held their first ever photo competition solely for young members of the society.

READ MORE

Young Member Committee Events at 11th ICG

During last month's 11th ICG in Seoul, Korea, young members (35 years of age and younger) from around the world met to network and spread ideas on how to promote and improve geosynthetic technology.

If you are a member of the IGS and want to get involved in the Young Members Committee or attend future events like this please get in touch with us!

READ MORE

Calendar of Events

Geosynthetics 2019 Houston, Texas, USA, February 10–13, 2019

TRANSOILCOLD 2019 St. Petersburg, Russia, May 20–23, 2019

7th ICEGE Roma, Italy, June 17–20, 2019

3rd ICITG Guimarães, Portugal, Sept. 29 – Oct. 2, 2019

READ MORE AT GEOSYNTHETICSSOCIETY.ORG

ΕΘΝΙΚΟ & ΚΑΠΟΔΙΣΤΡΙΑΚΟ ΠΑΝΕΠΙΣΤΗΜΙΟ ΑΘΗΝΩΝ

ΠΡΟΓΡΑΜΜΑ ΜΕΤΑΠΤΥΧΙΑΚΩΝ ΣΠΟΥΔΩΝ

ΣΤΡΑΤΗΓΙΚΕΣ ΔΙΑΧΕΙΡΙΣΗΣ ΠΕΡΙΒΑΛΛΟΝΤΟΣ, ΚΑΤΑΣΤΡΟΦΩΝ & ΚΡΙΣΕΩΝ

Δημοσιεύτηκε το 11ο τεύχος της έκδοσης "**NEWSLETTER OF ENVIRONMENTAL, DISASTER, AND CRISIS MANAGEMENT STRATEGIES**" του ΠΜΣ "Στρατηγικές Διαχείρισης Περιβάλλοντος, Καταστροφών & Κρίσεων" του Εθνικού & Καποδιστριακού Πανεπιστημίου Αθηνών.

Στο Newsletter παρουσιάζονται σημαντικά γεγονότα στα σχετικά επιστημονικά πεδία, με στόχο την άμεση ενημέρωση της διεθνούς επιστημονικής κοινότητας και του κοινού.

Στο 11ο τευχος παρουσιάζονται συγκεντρωτικά τα επιστημονικά και τεχνικά αποτελέσματα και δεδομένα που αφορούν στα **κατολισθητικά φαινόμενα στο Πλωμάρι Λέσβου (24 Νοεμβρίου 2018)**.

Το τεύχος είναι προσβάσιμο στο σύνδεσμο: https://edcm.edu.gr/images/docs/2018/Newsletter_2018_11_Plomari_slope_failures.pdf, ενώ πλάνα απο την **επιτόπια έρευνα του ΕΚΠΑ** είναι διαθέσιμα στο: https://youtu.be/xzI-oTIAU28

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