

ΕΛΛΗΝΙΚΗ ΕΠΙΣΤΗΜΟΝΙΚΗ ΕΤΑΙΡΕΙΑ ΕΔΑΦΟΜΗΧΑΝΙΚΗΣ & ΓΕΩΤΕΧΝΙΚΗΣ ΜΗΧΑΝΙΚΗΣ

# **Τα Νἑα** της Ε Ε Ε Γ Μ

63

Αρ. 63 – ΑΠΡΙΛΙΟΣ 2014

SIMSG ISSMGE



**7**° πανελληνίο σύνεδριο Γεωτεχνικής μηχανικής

Αθήνα, Αίγλη Ζαπηείου 5 - 7 Νοεμβρίου 2014

Διοργάνωση: Ελληνική Επισταμονική Εταιρεία Εδαφομηχανικής και Γεωτεχνικής Μηχανικής



Υπό την Αιγίδα

Τεχνικού Επιμελητηρίου Ελλάδος

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# 7° Πανελλήνιο Συνἑδριο Γεωτεχνικής Μηχανικής

# 5 – 7 Νοεμβρίου 2014 ΑΙΓΛΗ Ζαππείου, Αθήνα <u>http://www.7hcge2014.gr</u>

Η Ελληνική Επιστημονική Εταιρεία Εδαφομηχανικής και Γεωτεχνικής Μηχανικής, στο πλαίσιο των δραστηριοτήτων της, διοργανώνει το 7ο Πανελλήνιο Συνέδριο Γεωτεχνικής Μηχανικής υπό την αιγίδα του Δήμου Αθηναίων και του Τεχνικού Επιμελητηρίου Ελλάδας. Στόχος του Συνεδρίου είναι να καταγράψει τις προόδους της γεωτεχνικής μηχανικής στην Ελλάδα του 21ου αιώνα όπως αντικατοπτρίζονται στα ση-μαντικά γεωτεχνικά αλλά και άλλα έργα (σιδηροδρομικά, οδοποιίας, λιμενικά, υδραυλικά, κτιριακά, περιβαλλοντικά) με σημαντικό γεωτεχνικό αντικείμενο, που έχουν μελετηθεί και κατασκευαστεί ή κατασκευάζονται, καθώς και στα αποτελέσματα της ερευνητικής δραστηριότητας των ελληνικών πολυτεχνείων και πολυτεχνικών σχολών. Επιδίωξη είναι οι εργασίες του Συνεδρίου να αναδείξουν πρωτότυπα στοιχεία συμβολής της γεωτεχνικής μηχανικής αλλά και να προβάλουν θεωρητικές και πειραματικές έρευνες σε εδαφικά, βραχώδη και ημιβραχώδη υλικά που βρήκαν ή μπορούν να βρουν εφαρμογή στην πράξη."

Το συνέδριο θα διεξαχθή στο συνεδριακό κέντρο της ΑΙΓΛΗΣ Ζαππείου, από 5 έως 7 Νοεμβρίου 2014.

Η θεματολογία του συνεδρίου περιλαμβάνει κάθε πλευρά της γεωμηχανικής, όπως:

- Θέματα θεωρίας, έρευνας και πειράματος σχετικά με τη συμπεριφορά γεωυλικών, όπως συμπεριφορά εδαφικών, ημιβραχωδών και βραχωδών υλικών, έρευνες υπαίθρου και εργαστηρίου, ανάπτυξη και εφαρμογή πιθανοτικών και υπολογιστικών μεθοδολογιών στη γεωμηχανική, εδαφοδυναμική - βραχοδυναμική, γεωτεχνική σεισμική μηχανική.
- Θεωρητικά ή πρακτικά θέματα σχετικά με έργα γεωμηχανικής, δηλαδή έργα της κύριας αρμοδιότητας του γεωμηχανικού, όπως ευστάθεια πρανών, κατολισθήσεις, βελτιώσεις και ενισχύσεις εδαφών.
- Θεωρητικά ή πρακτικά θέματα γεωμηχανικής σχετικά με έργα στα οποία συμβάλλουν περισσότερες ειδικότητες μηχανικών, όπως θεμελιώσεις, βαθειές εκσκαφές και αντιστηρίξεις, σήραγγες και υπόγεια έργα, οδοστρώματα, επιχώματα, φράγματα, γεωπεριβαλλοντικά έργα, μικροζωνικές μελέτες.
- Διεπιφάνειες της γεωμηχανικής με άλλες επιστημονικές θεματικές περιοχές, όπως διδασκαλία και μάθηση, διασφάλιση ποιότητας, τυποποίηση και ορολογία, τεχνικά θέματα σχετικά με την ιστορική εξέλιξη της γεωμηχανικής.

Ιδιαίτερη έμφαση θα δοθεί στα εξής θέματα:

- Γεωτεχνικές πλευρές έργων ενεργειακής υποδομής
- Συνδυασμένος στατικός και γεωτεχνικός σχεδιασμός σύμφωνα με τον Ευρωκώδικα
- Περιστατικά κατάλληλα για τη διδασκαλία της γεωμηχανικής (βλέπε και παράλληλη ανακοίνωση για το σχετικό βραβείο).

# Θεματικές Ενότητες

- Συμπεριφορά Εδαφών: Έρευνες Υπαίθρου και Εργαστηρίου
- 2. Συμπεριφορά Εδαφών: Προσομοιώματα
- 3. Επιφανειακές και Βαθειές Θεμελιώσεις
- 4. Αλληλεπίδραση Εδάφους Κατασκευής
- 5. Πρανή Κατολισθήσεις
- 6. Βαθειές Εκσκαφές Αντιστηρίξεις
- 7. Σήραγγες
- 8. Βελτιώσεις Εδαφών
- 9. Φράγματα, Άοπλα Επιχώματα
- 10. Οπλισμένα Επιχώματα
- 11. Εφαρμογή Ευρωκωδίκων
- 12. Εφαρμογές Γεωσυνθετικών Υλικών
- 13. Εδαφοδυναμική / Τεχνική Σεισμολογία
- 14. Βραχομηχανική
- 15. Περιβαλλοντική Γεωτεχνική
- 16. Ενεργειακή Γεωτεχνική (energy geotechnics)
- 17. Πολιτιστική Κληρονομιά και Γεωτεχνική Μηχανική
- 18. Διδασκαλία και Μάθηση Γεωτεχνικής Μηχανικής

Τα άρθρα του συνεδρίου έχουν περάσει από κρίση περίληψης και θα περάσουν από κρίση πλήρους κειμένου με τις πιο κάτω προθεσμίες:

# Υποβολή πλήρους κειμένου: 30 Απριλίου 2014 Αποστολή σχολίων: 30 Ιουνίου 2014

# Υποβολή διορθωμένου κειμένου: 15 Αυγούστου 2014 Ειδοποίηση αποδοχής άρθρου: 30 Σεπτεμβρίου 2014

Οι οδηγίες μορφοποίησης των άρθρων έχουν αναρτηθεί στον ιστότοπο στην επιλογή «ΑΡΘΡΑ».

Το κόστος εγγραφής είναι 150 ευρώ ἑως τις 30 Σεπτεμβρίου 2014. Το κόστος εγγραφής καλύπτει το CD με τα πρακτικά του συνεδρίου, δεξίωση και καφἑ στα διαλείμματα.

Για νέους μηχανικούς (νεώτερους των 30 ετών) και φοιτητές το κόστος είναι 80 και 30 ευρώ, αντίστοιχα. Το κόστος εγγραφής καλύπτει το CD με τα πρακτικά του συνεδρίου και καφέ στα διαλείμματα. Όσοι εξ αυτών επιθυμούν να συμμετάσχουν στην δεξίωση θα πρέπει να αγοράσουν σχετικά κουπόνια στην τιμή των 40 ευρώ.

Μετά τις 30 Σεπτεμβρίου 2014, το κόστος προσαυξάνεται κατά 30 ευρώ, για κάθε κατηγορία.



# Tumbi Quarry landslide: was it caused by rainfall or seismic activity?

A paper by <u>Robbins et al. 2013</u>, reviews the landslide that occurred on January 24, 2012 in the Tagali Valley, Southern Highlands Province, Papua New Guinea (PNG). The fatal consequences of the landslide near the Tumbi Quarry, led to another investigation of the event.

As most landslides in PNG are caused either by rainfall or seismic activity, the paper focuses on these two factors in particular. It concentrates on the assessment of rainfall patterns in the area compared to rainfall accumulations obtained for previous failures as well as the evaluation of seismic motion. According to the paper, the landslide was not caused by the seismic activity in the area but by the heavy rain 2 weeks prior to the incident, as well as the intense rainfall 3 months before that. Additional anthropogenic factors in the adjacent region along with the geometry of the deep slope, as shown in the <u>cross-section</u> of the site, could have caused a significant decrease in slope stability.

Geoengineer, 05 November 2013

# A new paper on the Tumbi Quarry landslide in Papua New Guinea

Last year, and subsequently, I blogged on a number of occasions about the January 2012 Tumbi Quarry landslide in Papua New Guinea. In a nutshell, this very large landslide occurred in an aggregate quarry that had been used by contractors working for Esso Highlands (Exxon) in the construction of a pipeline. Everyone involved in the pipeline project denied that the quarry was in any way a factor in the landslide, even though this is by far the most likely cause. This image below shows the landslide, which killed at least 25 people and ruined the livelihoods of many more.



...

It seems to me that it is inconceivable to think that Esso / Exxon did not investigate this landslide themselves. It is interesting to note that they have not released the results of such an investigation.

Anyway, a paper (Robbins\_et al.\_2013 – sadly not open access, and not in either the Reading University or the Met Office online repositories) has appeared in the journal <u>Landslides</u> which explores the Tumbi Quarry landslide. The paper has been co-authored by meteorologists and geologists, although as far as I can see none have a long publication track record in landslide research. The paper

essentially examines the question of the trigger of the landslide, comparing the likelihood of a rainfall trigger versus the effects of a distant seismic event. However, in the introduction the paper also says that:

This paper gives a brief description of the landslide, with the main aims being: (1) to review the rainfall accumulations in the Tagali Valley prior to the landslide event, (2) review the likelihood that seismicity could have played a role in the failure and (3) provide an overview of the landslide in relation to the land use and activities at the quarry site.

In terms of the description of the landslide, the paper does a very reasonable job, although it does not really explore the possibility that the rear scarp of the landslide had an element of wedge failure (this would be an important consideration in stability modelling). Of course the meat of the paper is an investigation as to the role of rainfall triggering. The analysis here is comprehensive and interesting. The Tumbi Quarry landslide was a deep-seated failure, so one would expect that the landslide would respond to long term rainfall trends rather than short duration intense rainfall. The paper suggests that the months and days immediately prior to the failure did include the sort of rainfall events that have been associated with landslides in Papua New Guinea on previous occasions. However, the long term rainfall trend was below average, and the paper notes that:

The recurrence of below average monthly rainfall, particularly in November and December, and the timing of the slide at the start of the wet season, rather than the end, suggests that groundwater would have been close to the dry season low point or even lower, given the exceptionally low rainfall in August 2011. It seems unlikely therefore that groundwater played a significant role in the failure

The paper also looks at the role of seismicity in triggering the landslide – this is an interesting issue. They have examined the earthquake catalogue for events in Papua New Guinea in the 90 days prior to the landslide. The conclusion is, rightly, that seismicity played no role. On 14th December 2011 PNG was affected by an M=7.1 earthquake, but this occurred a month before the landslide at an epicentral distance of 478 km. The time delay and the distance both render it highly unlikely that this earthquake played a role. On the day of the landslide PNG was affected by a M=4.7 earthquake, but this occurred 446 km from the landslide site. Again, it is highly unlikely that this played any role. Thus, the seismic trigger hypothesis should be rejected.

A strange aspect of this paper is that the discussion of the role of quarry and land use changes in triggering the landslide is accorded just one paragraph, even though this is flagged early in the paper as being one of the core aims. The paragraph adds little to that already known; it highlights that the landslide occurred in the area that was being quarried, such that "[t]he additional extraction of material from the base of the steepest part of the slope may have weakened the integrity of the unit above...One factor which could be considered the most likely to have acted as a causal influence is the over-steepening of the existing steep slope by the extraction of additional material." The report notes that an IESC report from November 2011 "suggests that the site was 'benched and slopes have been stabilised such that the quarry is safe and could be reoccupied should this be required in the future' (D'Appolonia S.p.A. 2011b). Such measures would have been put in place to increase the stability of the slope and quarry area following material extraction." This may well be the case, but it is really important to note that benching would not increase the stability of a slope that was prone to the type of failure that actually occurred - indeed in some cases it could reduce the stability (if for example the toe of the slope was trimmed back to create the benches).

To me the most interesting aspect of this paper is the cross-section of the site, which is Fig. 3 in the paper:

# Tumbi Landslide, Papua New Guinea: rainfall induced?



A pre-failure slope profile of the landslide site derived from a 5-m DTM (from Robbins et al. 2013)

The cross-section picks out that the landslide occurred on a steeply dipping slide surface with a near vertical release surface at the rear. It is highly likely that removal of material from the toe of such a setting would decrease the stability of the slope, and it is equally unlikely that benching the slope would increase stability. This is a quarry setting that would alarm any geologist with a knowledge of landslides.

I don't want to be critical of this paper - the core aim is to analyse the rainfall conditions leading up to the landslide, and the paper does this really well. As such it is a useful contribution, as is the analysis of the likelihood of seismic triggering. However, in deep-seated landslides the actual trigger is often a sideshow - it is literally no more than the straw breaks that camel's back. The key issue is how the slope became destabilised. The team have not undertaken the sort of fieldwork at the site that would allow a definitive analysis of the causes of the landslide, so understandably this is covered only lightly and with understandable caution. However, it is really important to recognise that this analysis does not let the operators of the quarry off the hook - indeed, the cross-section suggests that it is far more likely that the quarry was the cause of the problem. If the operators thought that stability of this site could be assured through benching the slope then they were sadly mistaken. Of course, it is also not possible to say that the quarry was responsible for the landslide. This is simply unknowable based upon the information to hand, and it could only be resolved with a proper investigation. Throughout the last two years I have avoided pinning the blame on any particular cause, and I would reiterate again that we simply do not know why this landslide happened. What I find unbelievable is that a slide that killed so many people has not been properly investigated. That is surely a scandal.

# Reference

Joanne C. Robbins, Michael G. Petterson, Ken Mylne, & Joseph O. Espi (2013). Tumbi Landslide, Papua New Guinea: rainfall induced? *Landslides, 10*, 673-684 DOI: <u>10.1007/s10346-013-0422-4</u>

(http://blogs.agu.org/landslideblog/2013/11/04/tumbiguarry-landslide-paper/) Joanne C. Robbins, Michael G. Petterson, Ken To Pos: Norme 9Joseph 012540147 5036" E

#### Abstract

Approximate locati On 24 January 2012, a fatal landslide with an estimated (jointrault) intersect volume of 3 Mm<sup>3</sup> hit villagers and infrastructure in the Tagali Valley, Southern Highlands Province, Papua New Guinea (PNG). Although a moderate event by PNG standards, the associated human casualties and infrastructure destruction give a human as well as a scientific need to review the potential causes for the event. PNG experiences numerous landslides annually, most of which are trigged either by rainfall events or seismic activity. Here, we review the short-term rainfall patterns leading up to the slope failure at Tumbi Quarry and compare the rainfall accumula-Total tions obtained over durations of 30, 60 and 90 days prior to the landslide, with comparable rainfall accumulations obtained for other failures observed in PNG over a 12-year period. Additionally, a review of long-term rainfall over a period of 6 months prior to the failure is completed as well as an assessment of seismic activity. Based on our analysis, we believe a seismic trigger to be very unlikely, while the increase in rainfall in the 2 weeks prior to the failure in conjunction with a high-intensity rainfall event at the end of October 2011 could have had a greater influence in enhancing rather than restraining slope failure. This, in addition to natural denudational processes, geological structure and the anthropogenic activity in the vicinity of the landslide, could all have served to affect slope stability.

(Springer Link, <u>Landslides</u>, October 2013, Volume 10, <u>Issue</u> 5, pp 673-684, <u>http://link.springer.com/article/10.1007%2Fs10346-013-0422-4</u>)



# EPS Geofoam Protects Pipelines from Earthquakes

How does one mitigate the catastrophic effects earthquakes can have on pipelines? Geofoam is being utilized around the world to provide beneficial, dependable pipeline security in seismic zones.

On 26 December 2012, a gas pipeline blast followed by a mild earthquake struck Russia's Black Sea resort of Sochi, which will host the 2014 Winter Olympics. No one was hurt and there was no apparent damage to the city's infrastructure after a 5.2 magnitude earthquake was reported at 0242 local time. According to the United States Geological Survey, there are 14,000 earthquakes worldwide each year that have a magnitude of 4 or greater—700 of which occur in the United States and Alaska.

There are several methods for mitigating the effects of seismic activity on infrastructure, the most notable being the use of EPS geofoam as a seismic buffer for buried structures and rigid retaining walls. Six years ago, engineers Richard Bathurst, Saman Zarnani and Andrew Gaskin (2007) showed with shaking table testing and numerical modeling, that geofoam could reduce the seismic forces on rigid retaining walls. The lightweight EPS blocks that have become ubiquitous with highway embankments, green roofs, and landscape fill are growing in popularity for seismic and other buried applications.

Today the spotlight is shining on geofoam as a material with great potential for protecting pipelines. "If an earthquake occurs, high-pressure gas lines are one of the most important items to protect," claims Steven Bartlett. "If they rupture and ignite, you essentially have a large blowtorch, which can be catastrophic." Bartlett is associate professor of civil engineering at the University of Utah. He and his team have been examining geofoam's mitigating effects on pipeline damage due to seismic faulting since 2007.

<u>Geofoam</u> weighs roughly 1/100<sup>th</sup> of the weight of soil. "During the summer of 2007, Questar Gas Company requested that the University of Utah evaluate a conceptual EPS Geofoam cover system for a steel, natural gas pipeline crossing the Wasatch fault in the Salt Lake City valley," explained Bartlett. "The fault rupture is expected to produce an earthquake with a potential magnitude of 7.5 and several feet of potential fault offset at the pipeline crossing."

If a major earthquake were to strike the Wasatch fault zone in the Salt Lake Valley, the fault displacement and the subsequent weight of shifting and compacted soil on buried pipelines is likely to cause them to rupture. Many buried pipelines lie under six to eight feet of soil. Bartlett and his students at the University of Utah showed that a pipeline protected with a light-weight geofoam cover could withstand the fault offset and reduce the force on the by up to four times the amount of force as a pipeline covered with conventional soil backfill.

When the 37-mile long section of natural gas pipeline had to be replaced between Coleville and Ogden, Utah, approximately 20,000 cubic feet of ACH Foam Technologies' EPS Geofoam was specified to reduce movement, shears, axial forces and strains imposed on the pipeline. EPS types 22 and 15 were shipped from ACH Foam's local plant in Murray, Utah.

# Pipeline and EPS Cover Displacement Vectors During Faulting Event

"The goal of a geofoam cover system on top of a buried pipeline is to reduce the lateral, longitudinal and vertical forces induced on the pipe as the surrounding ground undergoes deformation," explained Terry Meier, geofoam expert at ACH Foam Technologies. The properties of geofoam have distinct advantages that lead to improved pipeline performance during large ground deformation.



"There are two main advantages that geofoam has over traditional earth cover materials. First is geofoam's low mass density—which reduces the vertical and horizontal stresses on buried utilities and compressive soils. This reduction in loading and deformation will likely improve the performance of a pipeline during and after a major seismic event along the fault area.

"The second advantage of <u>geofoam</u> is its use as a compressible inclusion for systems undergoing static, monotonic and dynamic loadings. Geofoam is somewhat compressible and controlled compression can be used to reduce earth pressure against buried structures as well as deformation induced by structural loadings. Bartlett's team confirmed that the loadings that cause compression may include static and dynamic lateral earth pressure swells, frost heave pressures, settlements of support soils, faulting, liquefaction, landslides and traffic loads," Meier added.

Geofoam: A Lightweight Cover System for Pipelines



Rough drawing of pipeline buffer using geofoam.

In some cases the geofoam blocks are covered with a geomembrane. This membrane helps to reduce the vertical uplift stress by reducing the friction force between the geofoam and the trench sidewall. In addition, placing a geomembrane around the geofoam block will provide added protection against a potential petroleum spill.

The reduction in loading and deformation due to geofoam's compressability will likely improve the performance of this

Weber Canyon pipeline during and after a major seismic event along the fault area.

ACH Foam Technologies has supplied EPS geofoam for a number of large transportation projects in Utah.

"Geofoam proved to be an incredibly time- and cost-saving material for the embankments along I-15 in Utah," said ACH Foam's Meier.

"After realizing the benefits of using geofoam for <u>Highway</u> <u>15</u> UTA specified it for its <u>TRAX light rail</u> projects. At the same time, it was used in the <u>Weber Canyon</u> and 3300 South pipeline replacement projects."

According to Bartlett, a new approach was taken to protect the 3300 South pipeline. "Questar Gas had to put the pipeline right down the center of the roadway. When we looked at what other countries did, they built a trapezoidal geometry above the pipe—basically just a wedge," says Bartlett.

Such a wedge would require many blocks of foam and would disrupt a large section of road. "This would have been a major problem in an urban area, as you might have to tear up 20 feet of lateral roadway. Try to do that for 3300 South – you'd have to shut the whole road down."

Rather than gut a major thoroughfare, Bartlett proposed a "slot trench" design in which a block of geofoam is placed in a narrow trench between a pipeline and the pavement above. In this design, if the pipeline begins to lift up, it will displace the geofoam block and compress it. Although geofoam is solid, it contains tiny air pockets that can compress without sacrificing the material's overall integrity. As the geofoam is compressed further, it will slide upward along the trench sidewalls and could eventually damage the pavement above.



However, says Bartlett, the pipeline will remain intact and essentially undamaged.

Since the 3300 South project, Questar has been installing geofoam to protect other natural gas pipelines in the valley and elsewhere.

New research is being conducted to measure the effectiveness of geofoam to help new buildings withstand earthquakes. "The use of Geofoam backfilling against a vertical structure significantly reduces and or completely eliminates lateral pressure on that structure, whether it is a bridge abutment, retaining wall, or foundation wall," said Meier. "For example, with a foundation wall going 30 feet below grade, the compacted soil will create 3,750 lbs of vertical pressure at the wall base and 1,250 lbs of lateral pressure at the base of the foundation wall. The use of Geofoam will greatly reduce lateral and vertical pressure." From "Numerical Investigation of Geofoam Seismic Buffers Using FLAC" (2005):

In a typical geofoam embankment (such as that pictured above), the bottom to top layers consist of bedding sand, geofoam block, reinforced concrete load distribution slab, road base (untreated base course), and concrete pavement. A prefabricated tilt-up concrete panel wall protects the geofoam from damage and the wall is founded on an embedded slot footing. The panel wall is connected to the load distribution slab and a coping formed in the concrete pavement protects the panel top. An elastomeric material is placed between the coping and the panel top to limit the vertical and horizontal interaction at this point. In addition, the geofoam blocks do not contact against the back panel wall. Typically, a 0.2-m gap is left between the geofoam and the back of the wall to prevent interaction. However, continuous horizontal layers exist in the geofoam mass, which can allow for interlayer sliding if horizontal seismic forces are sufficient to initiate it. No such vertical planes exist, because shear keys are used in which the blocks are staggered and the orientation is rotated 90 degrees on each successive layer. The bottom layer of geofoam is placed directly against the slot footing of the tilt-up panel wall and is constrained from horizontal movement.

Geofoam's light weight and compressive resistance makes it an ideal fill material for pipeline protection as well as highway embankments, landscape fill and green roofs. New information is pointing to its value as a potential seismic buffer for structural and infrastructure applications.

For more information on ACH Foam Technologies EPS Geofoam visit <u>http://www.achfoam.com</u> or phone 800.525.8697.

For over four decades ACH Foam Technologies has been an industry leader in EPS manufacturing, providing products for construction, geotechnical, packaging, and industrial applications. With locations throughout the U.S., ACH is positioned to offer convenient, valuable, and complete solutions for its customers. ACH recycles 100% of its post-industrial EPS and is actively involved in recycling post-consumer EPS as well.

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(Story by <u>ACH Foam Technologies</u>, October 8, 2013, <u>http://www.geosynthetica.net/eps-geofoam-earthquakes-pipelines</u>)

# ΠΑΡΟΥΣΙΑΣΗ ΕΡΕΥΝΗΤΙΚΟΥ ΠΡΟΓΡΑΜΜΑΤΟΣ

# DARE

Soil-Foundation-Structure Systems Beyond Conventional Seismic "Failure" Thresholds : Application to New and Existing Structures and Monuments

# www.ideas-dare.com

# The Main Concept of the Project

Conventional seismic design for soil- foundation-structure interaction is still based on the "prudent" conservative approach inherited from static geotechnical and structural engineering:

Exceedance of a number of thresholds that lead to the creation of failure mechanisms in the supporting soil or at the footing-soil interface must be avoided.

This is accomplished by the use of "overstrength" factors plus (explicit and implicit) factors of safety.

However, a growing body of evidence suggests that soilfoundation inelastic and nonlinear response under seismic excitation is unavoidable, and at times even desirable. Our research helps break away with the very philosophy of the conventional approach for seismic loading and contributes in a decisive way towards a soil-foundation-structure design that can survive seismically while operating at the verge of failure. You are most welcome to visit the project site:

# http://ideas-dare.com ®RESULTS and DOCU-MENTS®PUBLICATIONS ®JOURNALS or CONFERENCES

where you can browse and download all the *publications* funded by this project including journal and *conference papers* and *technical reports*.

I hope you find this interesting.

George Gazetas



# ΝΕΑ ΑΠΟ ΤΙΣ ΕΛΛΗΝΙΚΕΣ ΚΑΙ ΔΙΕΘΝΕΙΣ ΓΕΩΤΕΧΝΙΚΕΣ ΕΝΩΣΕΙΣ



# International Society for Soil Mechanics and Geotechnical Engineering

# MESSAGE FROM THE NEW ISSMGE PRESIDENT Prof. Dr.-Ing. Roger Frank

Dear Members of ISSMGE, Dear Colleagues,

It is a great honour and privilege for me to have been elected by the Member Societies of ISSMGE as your President for the 4-year term from 2013 to 2017. The election took place during the Council meeting, just before the opening of the 18<sup>th</sup> International Conference on Soils Mechanics and Geotechnical Engineering (18 ICSMGE) in Paris, 2-6 September 2013.

Before updating you with the various matters which might be of interest to you, I would like to acknowledge the great work and achievements of my two predecessors, President Pedro Sêco e Pinto and President Jean-Louis Briaud. I was a member of the Board during their two mandates and it was a real pleasure to work under their leadership, with the efficient assistance of our Secretary General Neil Taylor. My deep gratitude also goes to many officers of ISSMGE and to all of you who made ISSMGE what it is. Now, I am "in charge"... I feel that it is truly a great challenge for which I shall devote all my possible energy and enthusiasm.

I have chosen to express my news, comments and ideas in these columns of our ISSMGE Bulletin because I feel that is the natural channel for communication between us. It will be my main channel of communication during my mandate.

As the new President, I have to comment first on the 18 ICSMGE, held in Paris, trying to be the judge and no more the party! Some 2000 scientists from 100 countries participated in the event (1875 colleagues, exactly, were registered for the scientific sessions – see report by the French Society CFMS in this issue of ISSMGE Bulletin). For many of the participants, I understood that the Paris Conference was a real success. This is the best reward for the French Society (CFMS) which worked very hard for the event during the past 4 years. One of the main lessons to be drawn concerns the mobilisation created inside ISSMGE itself, through its Technical Committees (TCs) and their Officers. Indeed, not only were the TCs involved with selecting 7 honour lecturers for the plenary sessions (following the wish of Jean-Louis), but also were in charge of organising the scientific content of all the parallel sessions (discussion sessions, poster sessions and workshops). This resulted in a very high scientific level for all the sessions, which was recognised by many of the participants. I wish to thank here all the contributors, in the plenary sessions and in the parallel sessions, for the quality of their presentations and for the dedication they showed to ISSMGE. I shall certainly examine, as soon as possible, with the Board and with the organisers of the 19th ICSMGE in Seoul (2017) if we can, and how we can repeat this successful involvement of ISS-MGE TCs.

The 5th International Young Geotechnical Engineers' Conference (iYGEC 2013) held just before the 18 ICSMGE was also a great success. It brought together 164 participants from 57 countries – see report by Yu-Jun Cui, Chair of the iYGEC OC in this issue of ISSMGE Bulletin.

Let me introduce to you the new ISSMGE Board and its 12 members; see:

# http://www.issmge.org/en/the-society/the-board/home

Apart from the President, the immediate Past President (Jean-Louis Briaud) and the Secretary General (Neil Taylor), the six Vice-Presidents of ISSMGE now sitting on the Board are: Fatma Baligh (for Africa), Ikuo Towhata (for Asia), Mark Jaksa (for Australasia), Antonio Gens (for Europe), Paul Mayne (for North America) and Jarbas Milititsky (for South America), as well as three members appointed by me after consultation (following the ISSMGE statutes): Marc Ballouz (Lebanon), Etienne Marcelin Kana (Cameroon) and Nicoleta Rădulescu (Romania). Note that, if I am correct, it is the fist time that we have two ladies sitting on ISSMGE Board.

The Board will hold its first in-person meeting in London on 18-19 March 2014, at the invitation of Geotechnical Consulting Group and the British Geotechnical Association. This will allow us to participate in the Rankine Lecture at Imperial College, to be delivered by Professor Guy Houlsby from Oxford University. We are also invited to the Pre-Rankine Seminar held at Imperial College, dedicated this year to Professor Nicholas Ambraseys, who passed away in December 2012. It is intended that the main discussion topics and decisions taken by the Board will be posted on the ISSMGE website by our Secretary General.

The Board has maintained most of the working structure of ISSMGE established by Jean-Louis Briaud. Six of the previous Board Level Committees (BLCs) have been retained and the Chairs have already been nominated by the Board. See: http://www.issmge.org/en/the-society/working-structure-issmge :

- Awards Committee (AWAC), Chair: Charles Ng (Hong Kong)

- Corporate Associates Presidential Group (CAPG), Chair: Sukumar Pathmanandavel (Australia)

- Innovation and Development Committee (IDC), Chair: Dimitrios Zekkos (USA)

- Public Relations Committee (PRC), Chair: Sherif Wissa (Egypt)

- Students and Young Members Presidential Group (SYMPG), Chair: Jennifer Nicks (USA)

- Technical Oversight Committee (TOC), Chair: Pierre Delage (France).

The BLCs have resumed their work and are, presently, in the process of updating their membership and reviewing their terms of reference.

It has been agreed that all the six ISSMGE Vice-Presidents will sit on the TOC, in order to facilitate, in particular, the communication and coordination with the TCs (current and planned) hosted by the Member Societies in their respective

Region. The VPs have each nominated a colleague from their Region to assist them on the Committee.

# Visit to the Victor de Mello library space

Very recently, I had the chance to visit the space of the library of the Polytechnic School of the University of São Paulo (Brazil) devoted to Victor de Mello, President of ISS-MGE 1981-1985 (see: http://www.issmge.org/en/announcements-en/314-past-president-victor-de-mello-passes-away). This space gathers all the books, documents and journals belonging to Victor de Mello. According to our colleague, Waldemar Hachich, Vice-President for South America 2005-2009, the Victor de Mello space includes:

- about 1500 titles of books and conference proceedings (over 2000 volumes);
- about 200 collections of journals and magazines, the most important of them being complete from the fifties till 2003 (the Polytechnic School has ensured the continuity of most of the collections to the present day);
- hundreds of files of projects on which Victor worked for about five decades.

My visit to the Victor de Mello space with our colleagues from São Paulo, Waldemar Hachich and Werner Bilfinger (see photo), gave me a feeling of deep recognition of Victor. While I was going through some of his hand-written pencil notes (Victor would annotate most of his books and journals!), it came back to my mind the wonderful moments one would spend in his company. His extremely wide culture, his deep expertise on nearly all topics of geotechnical engineering, his kindness, modesty, permanent concerns about the younger ones and his friendship impressed me each time I had the chance to meet him or visit him.



2 October 2013. Waldemar Hachich, Roger Frank and Werner Bilfinger (from left to right) visiting the Victor de Mello library space in the Polytechnic School of the University of São Paulo

Bye bye for now! I will soon be back in contact with you in these columns. In the meantime, do not hesitate to write to any one of us, the Board members or the BLCs' Chairs, if you wish to clarify something or if you wish to raise a question about ISSMGE and its governance!

Roger Frank

Paris, 20 November 2013



**(3 8)** 

# The ISRM Online Lectures

Μέχρι σήμερα έχουν παρουσιασθή οι πέντε παρακάτω ISRM Online Lectures:

# 1<sup>st</sup> ISRM Online Lecture

10 a.m. GMT - 19 February 2013

**"50 Years of NATM – from a construction method to a system"** by Prof. Wulf Schubert Graz University of Technology, Austria



# 2<sup>nd</sup> ISRM Online Lecture

10 a.m. GMT - 28 May 2013

# "Solving the Unsolved Problems in Rock Mechanics and Rock Engineering"

by

Emeritus Professor John A. Hudson Imperial College, UK Fellow of the Royal Academy of Engineering



**3rd ISRM Online Lecture** 

10 a.m. GMT - 13 September 2013

"Rock Mechanics Lessons from Dams" by Professor Pierre Duffaut, France



4<sup>th</sup> ISRN Online Lecture 12 December 2013

"Catastrophic landslides. The legacy of Vajont" by Prof. Eduardo Alonso, UPC Barcelona



# ΤΑ ΝΕΑ ΤΗΣ ΕΕΕΕΓΜ – Αρ. 63 – ΑΠΡΙΛΙΟΣ 2014

Σελίδα 10

# **5<sup>th</sup> ISRM Online Lecture**

9 a.m. GMT – 10 April 2014

"Implementing a Reliable Slope Design"

by Dr. John Read, Australia Large Open Pit Project CSIRO, Australia



Όλες οι διαλέξεις είναι ανηρτημένες στον ιστότοπο της ISRM (<u>http://www.isrm.net/gca/index.php?id=1104</u>).

# ΠΑΡΟΥΣΙΑΣΕΙΣ ΕΚΔΗΛΩΣΕΩΝ ΓΕΩΤΕΧΝΙΚΟΥ ΕΝΔΙΑΦΕΡΟΝΤΟΣ

# Record of the ISRM Design Methodology Commission Meeting

held on Sunday, 22 September 2013 at the Sofitel Hotel, Wroclaw, Poland

# **1 BACKGROUND**

The ISRM Commissions are now overseen by a Technical Oversight Committee. A recent report on the progress of the ISRM Design Methodology Commission and its meetings to date in the Presidential tenure period of 2011–2015 was written for this Committee and was attached as the Annex to the record of the last meeting held in Shanghai in June 2013.

# 2 ATTENDANCE AT THE WROCLAW 22 SEPTEMBER MEETING

Those attending the Design Methodology Commission's meeting in Wroclaw are shown below, from left to right, Antonio Samaniego, Xia-Ting Feng, Resat Ulusay, Christophe Vibert, Carol Hudson, John A. Hudson, Erik Johansson, Conrad Felice and Petros Fortsakis.



# **3 MEETING AGENDA**

The following subjects were discussed at the meeting:

- Overview of the Commission's progress to date (JAH)
- Empirical design methods in mining (AS)
- Interactions with EUROCODE7 (All)
- Content of the Commission's final report (JAH)
- Plans for ARMS8 in Japan: Workshop? Short Course? Specialised Session? (All)
- Any other business.

# 4 OVERVIEW OF THE COMMISSION'S PROGRESS TO DATE

The purpose of this Commission is to improve methods of rock engineering design. The ISRM Design Methodology Commission has organised three symposia over the years: the SINOROCK Symposia.

 the first was held at the Three Gorges Dam Project site in 2004;

- the second was held at the University of Hong Kong, as the main ISRM Symposium for 2009;
- the third was the SINOROCK2013 Symposium held in Shanghai in June, 2013.

Also, an interim meeting of the Commission was held in association with the EUROCK2012 Symposium held in Stockholm in May, 2012 (see photo below).



In addition, a further meeting of the Commission was held in Wuhan, China in December, 2012. At this meeting, there were three presentations: "Risk assessment of rockbursts in the process of tunnel excavation by drill and blast method in deep-buried hard rock"; "Construction risk assessment for a large underground cavern group"; and "Overview of the ISRM Design Methodology Commission's work". Discussion on these projects and the work of the Commission then followed.

The meeting held in association with SINOROCK2013 in June was attended by Luis Lamas, Xia- Ting Feng, Wulf Schubert, Antonio Samaniego, Lauri Uotinen, Carol Hudson, John Hudson, Philippe Vaskou, Resat Ulusay and Christophe Vibert. This meeting was described in the most recent ISRM Newsletter.

# 5 EMPIRICAL DESIGN METHODS IN MINING (ANTO-NIO SAMANIEGO)

Antonio Samaniego presented an update on his Sub-Commission on Applied Empirical Design Methods for Mining. The purpose of this Sub-Commission is to develop guidelines for the application and development of design methods for mining.

The background for the Sub-Commission was explained by Antonio as follows.

- The field of empirical mine design can be broken into the broad categories of pillar design and opening design.
- Opening design has evolved from the tunnel span design methods of the 1960s and 1970s.
- Underground mine openings have more complex geometries than those found in tunnels, which have required different design approaches that usually combine empirical and numerical methods.
- Some of the first applied empirical mine design methods for openings originated over 30 years ago with the work of Mathews (1981) and Laubscher (1976).
- Applied pillar design work has developed from early coal mining with applied design curves developed by Lunder (1997) and later by Pakalnis (2001).
- Extensive work in areas of drift and stope openings and pillar design has been conducted in Australia and Canada with some of the most widely applied methods originating at the University of British Columbia, Canada (Mathews, 1981, Potvin, 1988, Nickson, 1995).
- Empirical design methods are evolving and the application of some of these methods is becoming confusing.

The methods are being modified and used in new ground conditions and mining environments, sometimes without regard to the original conditions the design methods were developed for; therefore, the scope of the Commission is to revise their application.

The anticipated products of the Sub-Commission are as follows.

- A 'state-of-the-art' report on the principles of applied empirical design methods in mining, and the guidelines and application of the major currently applied empirical methods.
- A database of case histories using the major empirical design methods will be available on the ISRM website.
- A conference on Applied Empirical Design Methods in Mining will be organised for June 2014 in Lima Peru.

The report will be made available to ISRM members through the ISRM website and may also be submitted for publication as a review article in the Int. J. of Rock Mech. and Mining Sci. or in the Rock Mech. & Rock Eng. Journal.

The Sub-Commission members on Empirical Design Methods in Mining are:

# Co-Presidents:

Rimas Pakalnis, Canada; Doug Milne, Canada; Antonio Samaniego, Peru ( Co-ordinator) .

# Members from the Mining Industry:

Jerry Rahn, Kinross, Canada; Don Grant, BHP, Australia; Ronald Lachenich, Newcrest, Australia; Mark Ruest, De-Beers, South Africa; Geoff Capes, Newcrest, Australia; Per Lunder, De Beers, Canada; Raimundo Almenara, RTZ, USA; Mike Yao, Vale, Canada; James Hatley, Cameco, Canada; Lyndon Clark, RTZ, Canada; John Henning, Goldcorp, Canada; Lou Sandbak, Barrick, USA.

# Members from Academia:

Jack Parker, USA; John Hadjigeorgiou, Canada; Ernesto Villescusa, Australia; Marty Hudyma, Canada; Donna Beneteau, Canada; Stan Vitton, Michigan Tech, USA; Yves Potvin, U of Western Australia.

#### Members who are Consultants:

John Tinucci, SRK, US; Trevor Carter, Golder, Canada; Mike Sandy, AMC, Australia; Pravin Kumar, Snowden, Australia; Peter Lawerence; Dempster Seymour; Henrique Rubio, Chile; Wilson Blake, USA.

The Sub-Commission is organising the 1st Specialised Conference on Applied Design Methods in Mining as follows.

- Date: 9–11 June, 2014
- Venue: Convention Centre Sheraton Hotel, Lima, Peru
- Organiser: SPEG, Peru ; ISRM, NG
- Institutional Sponsors: ISRM, MEM, OSINERGMIN, IMP, CIP, PUCP, UNI...
- Exhibition Sponsors: Aceros Arequipa, Unicon, SVS/SRK

The conference topics will be:

- Geotechnical data gathering and systems of Rock Mass Classification
- Rock Mass Characterisation
- Empirical open stope design and other underground excavations
- Design of surface excavations
- Excavation performance and risk management

Important dates are as follows:

- Abstracts submittal: November 15th, 2013
- Selection of papers: December 30th, 2013
- Final submittal of technical papers: February 28th, 2014



The International Advisory Committee consists of:

- E.T. Brown (Golder Ass., Australia)
- Yves Potvin (ACG, Australia)
- Alvaro Gonzales (SCG, Colombia)
- Xia Ting Feng (ISRM, China)
- John Tinucci (SRK, Denver, USA)
- Eda Quadros (BG Tech Soil and Rock Engineering Ltda,
- Brazil) • Dermot Rose- Brown (SRK, USA)

The Organising Committee consists of:

- Rimas Pakalnis (Pakalnis Ass., UBC, Canada)—Chairman of the Scientific Committee
- Antonio Samaniego (SVS, Lima, Peru)—Chairman of the Organising Committee
- Doug Milne (University of Saskatoon, Canada) Co-Chairman of the Scientific Committee
- Carlos Soldi (SVS, Lima, Peru)—Secretary General
- David Córdova (DCR, Lima, Peru, Universidad Nacional de Ingenieria.)
- Victor Gobitz (ISEM, Lima, Peru, Compañía Minera Milpo)
- Carlos Vallejo (JB &Aso., Lima, Peru)
- Orlando Felix (SVS, Lima, Peru)

Keynote Lectures are anticipated to be given by:

- Evert Hoek
- Dick Bieniawski
- Nick Barton
- Oscar Steffen—Confirmed
- Manuel Romana-Confirmed
- Ives Potvin-Confirmed
- Rimas Pakalnis—Confirmed
- Xia Ting Feng
- Ernesto Villaescusa
- Alan McCraken
- D Laubscher
  Jarek Jakubec
- David Beck

Short Courses will be held on 8th June 2014 / 12th June 2014:

- Geotechnical Design for Sublevel Open Stopes.—Ernesto Villaescusa
- Empirical Design Methods for Underground Excavations in Mining. —Yves Potvin
- Rock Mass Characterization.—Doug Milne.

• Dilution Control in Mining.—Rimas Pakalnis

\* \* \* \* \*

Following Antonio Samaniego's presentation of the above information on the sub-Commission, Conrad Felice said that the NIOSH group in the USA (who have money for research) may be interested and that he would be able to help make contact with NIOSH. Chistophe Vibert asked if rockbursts would be covered in the conference. Antonio replied that there exists another group on deep mining and that his conference will concentrate on open stopes and narrow veins.

John Hudson congratulated Antonio on his excellent initiative and organisation, noting that this 1st Specialised Conference on Applied Design Methods in Mining will be a major contribution to the activities of the ISRM and to the Design Methodology Commission's work.

# **6 INTERACTIONS WITH EUROCODE7**

John Hudson reminded the meeting that EUROCODE7 issues had been discussed at the previous meeting in Shanghai. An excerpt from the record of that meeting is as follows.

\* \* \* \* \*

3.3.3 EUROCODE7

With regard to Thierry's point about EUROCODE7, Luis Lamas is a member of the Evolution Group 13 and he explained that the code will be imposed throughout Europe and that the Commission's report on risk should include discussion of EUROCODE7. Luis explained that the geotechnical aspect of the code is in force in European countries. It has been written by soil mechanics practitioners and is not suitable for rock. It depends on calculations relating to the limit method. Lauri Uotinen noted that EUROCODE7 does not work for rock and Finland has its own national version. The whole EUROCODE is now under revision by 14 Evolution Groups, one of them being for rock engineering: Evolution Group 13. John Harrison is the Chairman of Evolution Group 13 and there will be a Workshop and paper at EUROCK2013 produced by the Group.

\* \* \* \* \*

John Hudson reviewed the problems with EUROCODE7 not being applicable to rock. Erik Johansson said that Finland, together with Sweden, are developing their own code based on EUROCODE. The EUROCODE group (EC 13, Chairman John Harrison) was holding a meeting at the same time as this Design Methodology Commission meeting and our Commission member, Antonio Sofianos, was representing us at that meeting.

Christophe Vibert said that he had attended a meeting in France where many did not favour EUROCODE for rock, due to the many safety factors involved which introduced uncertainty. He continued by asking what would be the status of the code in say 30 years' time—given that too much regulation would be introduced which is not applicable to rock.

Erik Johansson will send some information to John Hudson on the Finnish-Swedish group's activities in connection with EUROCODE7.

# 7 CONTENT OF THE COMMISSION'S FINAL REPORT (JAH)

John Hudson presented the outline for the final report of the Commission (due in 2015) as follows:

- Rock engineering risks: the key issues
- Risk analysis techniques in rock engineering
- Reducing epistemic uncertainty
- Reducing aleatory uncertainty
- High rock stresses and the Jinping II deep tunnels, China
- JinPing II underground powerhouse, China
- Rock engineering risk assessment protocols
- Example of the use of risk assessment protocols

Draft chapters will be sent out to the Commission members for comment in due course.

Conrad Felice raised the issue of how baseline reports are generated for rock in comparison with soil (because they can form part of a contract and be considered in claims).

# 8 PLANS FOR THE ARMS8 SYMPOSIUM, JAPAN, OC-TOBER 2014

At an earlier meeting of this Commission, the following was noted.

\* \* \* \* \*

During discussion on future meetings, it was suggested that the Commission could organise a Short Course on Risk at the Sapporo 2014 International ISRM Symposium and that Herbert Einstein of MIT could present such a lecture for the Short Course. Wulf Schubert volunteered to contribute as well.

ACTION ITEM: John Hudson to ask for further suggestions for potential contributors.

\* \* \* \* \*

During this Wroclaw meeting, the Commission further developed the idea. It was considered that both a Short Course and a Special Session could be developed for the ARMS8 Symposium. This was agreed at the meeting after discussion.

Potential contributors include: recommendations from Resat Ulusay concerning personnel from Geodata; Herbert Einstein, a colleague of Antonio Samaniego, Conrad Felice, a colleague of Christophe Vibert, a colleague of Erik Johansson, John Harrison, John Hudson, Wulf Schubert.

Conrad Felice said that he would send a link for free information from the National Academy of Sciences in the USA.

[Following the Commission meeting, John Hudson discussed the options in detail with Professor Shimizu who is responsible for the ARMS8 arrangements. John Hudson suggested to him that the Commission would like to

- Hhold a Short Course on "Rock Engineering Risk" consisting of eight lectures, each one being given by an expert recommended by the Design Methodology Commission. The Short Course would be free to participants. Professor Shimizu is able to supply a room free of charge for participants but participants may have to pay for lunch and coffee.
- Arrange a Special Session on "Rock Engineering Risk" perhaps with some stimulated papers, but mainly by identifying papers already submitted to the Symposium.]

Professor Shimizu was happy with these suggestions. John Hudson will follow up on contributors to the Short Course.

We have to be careful with the timing of the presentations for those Short Course, asking speakers who will be attending the Council meeting in the afternoon of Monday 13 October 2014 to give their presentations in the morning.

Christophe Vibert gave John Hudson a copy of "Risk Management Vocabulary IOS Guide 73 Revision 2002 Draft Version 2009" (in French and English).

# **9 ANY OTHER BUSINESS**

Resat Ulusay noted that it would be helpful to produce a 'leaflet' describing all the rock mass classification systems with their pros and cons. He also drew attention to the paper he has co-authored on a new classification system (RMQR) published in Rock Mech. Rock Eng., see below.

Rock Mech Rock Eng DOI 10.1007/s00603-013-0462-z

ORIGINAL PAPER

- 2 A New Rock Mass Quality Rating System: Rock Mass Quality
- 3 Rating (RMQR) and Its Application to the Estimation
- 4 of Geomechanical Characteristics of Rock Masses

5 Ömer Aydan • Reşat Ulusay • Naohiko Tokashiki

\* \* \* \* \*

John Hudson concluded the meeting by thanking all those present for their attendance and contributions.

(Πέτρος Φορτσάκης)

03 80



# Landslides in hard soils and weak rocks an open problem for Mediterranean countries 21 and 22 October, 2013, Naples, Italy <u>www.mwl.unina2.it</u>

Στις 21 και 22 Οκτωβρίου 2013 διεξήχθη το "Mediterranean Workshop on Landslides" με θέμα "Landslides in hard soils and weak rocks - an open problem for Mediterranean countries", το οποίο διοργανώθηκε από κοινού από τα πανεπιστήμια Second University did Napoli, the University did Napoli Federico II και Universidad Polytechnic de Cataluña. Το συνέδριο αυτό τέθηκε, εκτός των άλλων, και υπό την υποστήριξη της Ελληνικής Επιστημονικής Εταιρείας Εδαφομηχανικής και Γεωτεχνικής Μηχανικής.

Το συνέδριο περιελάμβανε 5 introductory reports και 16 προσκεκλημένες διαλέξεις, με την πρώτη ημέρα –ενότητα να αφιερώνεται στο "Landslides in HSWRs and Relevant Material Properties" και τη δεύτερη μέρα – ενότητα στο "Mechanisms of earthflows".

Η Ελληνική συμμετοχή περιελάμβανε τους:

Αναπληρωτή Καθηγητή ΕΜΠ Μ. Καββαδά στην πρώτη ενότητα σαν introductory report με θέμα "Modeling of HSWR for the Investigation of Landslides"

Επίκουρο Καθηγητή ΑΠΘ Β. Μαρίνο και Ομότιμο Καθηγητή ΕΜΠ Π. Μαρίνο στην πρώτη ενότητα σαν προσκεκλημένη διάλεξη με θέμα "Landslides in flysch" (παρουσιάστηκε από τον Π. Μαρίνο) και

Δρ Γ. Μπελόκα και Δρ. Γ. Ντουνιά στη δεύτερη ενότητα σαν προσκεκλημένη διάλεξη με θέμα "The Tsakona landslide in Peloponnese – Greece" (παρουσιάστηκε από τον Γ. Μπελόκα).

Επιλεγμένα άρθρα πρόκειται να δημοσιευτούν σε διεθνές περιοδικό

Γ. Μπελόκας



Ο Καθ. Μιχάλης Καββαδάς παρουσιάζει την εισήγησή του



Ο Καθ. Παύλος Μαρίνος παρουσιάζει την εισήγησή του



Ο Δρ. Γιώργος Μπελόκας παρουσιάζει την εισήγησή του

# ΠΡΟΣΕΧΕΙΣ ΕΚΔΗΛΩΣΕΙΣ ΓΕΩΤΕΧΝΙΚΟΥ ΕΝΔΙΑΦΕΡΟΝΤΟΣ ΣΤΗΝ ΕΛΛΑΔΑ



# 30 September - 3 October 2014, Athens, Greece www.eetc2014athens.org

It is our pleasure to inform you that the Greek Tunnelling Society is organizing the 2<sup>nd</sup>Eastern European Tunnelling Conference in Athens on September 28 – October 1 2014 (EETC2014, Athens).

The Eastern European Tunnelling Conference is a biennial regional traveling conference. It aims to promote the sharing of knowledge, experience, skills, ideas and achievements in the design, financing and contracting, construction, operation and maintenance of tunnels and other underground facilities among the countries of Eastern Europe, on an organized basis and with agreed aims. EETC2014 aims mainly to bring together colleagues from Eastern Europe but people from the rest of the world are also welcome.

The theme of EETC2014 Athens is:

### "Tunnelling in a Challenging Environment" Making tunnelling business in difficult times

The construction of underground projects is becoming increasingly demanding as new challenges are emerging in every aspect and sector of this multidisciplinary and multifarious business. Further to the usual geological, geotechnical, structural and operational challenges, we are now facing a difficult business and financial environment, which requires the deployment of even more intelligent and effective tools and solutions.

I really do hope that the EETC2014 Athens will contribute and further facilitate the growth of the tunnelling business and will be a forum for scientific and professional collaboration.

# TOPICS:

- Innovative methods for Analysis and Design
- Tunnelling in difficult ground conditions
- Conventional urban or shallow tunnelling
- Mechanized tunnelling
- Hydraulic tunnels
- Underground complexes
- Caverns for Hydropower or Storage
- Pipe jacking and microtunnelling
- Innovations in tunnelling construction technology
- Tunnels and shafts for mining

- Rehabilitation and repair
- · Safety and security in tunnels and tunnelling
- Contractual and financial issues
- Education and training
- Case histories
- Underground space use
- Tunnels and monuments



# ΠΡΟΣΕΧΕΙΣ ΓΕΩΤΕΧΝΙΚΕΣ ΕΚΔΗΛΩΣΕΙΣ

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



# 82nd Annual Meeting of ICOLD Dams in Global Environmental Challenges Bali, Indonesia ~ 1-6 June 2014 <u>http://www.icold2014bali.org</u>

More than a thousand dam experts, engineers, scientists, consultants, operators, as well as high level representatives from governments, NGOs and Development Banks will meet in Bali, for the 82nd annual meeting of ICOLD.

Bali has a proven record of hosting international events and offers the opportunity to see its boundless variety of unique sceneries as well as countless traditional and cultural heritages.

An International Symposium on the theme "Dams in global environmental challenges", with seven sessions is organized on June 4th.

The topics in the international symposium are listed as follows:

# 1. Social and environmental aspects of dam

Green House Gas Effects of Dams Public participation Institutional aspects on Dams Land acquisition and resettlement Environmental management during construction

# 2. Engineering issues in dam development

Management of aging dams Instrumentation for aging dams Underground dams Dam development in landslides and disturbed environment ("natural dams") Engineering aspects in dam safety

# 3. Challenges in tailing dam (TD) project

Institutional aspects on TD Risk analysis of TD Environmental impacts of TD Environmentally save design of TD The safe and responsible long term management of TD Mine waste management and mine life management framework Risk Management and risk assessment Environmental aspects Management tools for TD Regulatory and Institutional Aspect

4. Dams and water quality management

Assessment of sedimentation in reservoir

Reservoir amenity management Negative impact of floating ponds on reservoir water quality Bio-geo chemical balance disturbances and countermeasures

Water quality modeling

5. Catchment area management for sustainable dam development

Land use planning Sediment control Assessment of catchment erosion Public participation Land and water conservation

6. Challenges in dam safety policy and implementation

Monitoring and early warning system Risk analysis and management in dam safety Inspection and instrument monitoring for dam safety Practical risk management tools for prioritizing upgrades to dams Safety policy and adaptive management system in dam operation

# 7. Dam operation in connection with climate change

Adaptation and mitigation of climate change in dam operation

Role of dam operation in food, energy, and water security

Flood and drought analysis for spillway discharge capacity and increasing reservoir storage

Revitalization of existing dams and reservoirs

Dam operation challenges in reducing green house emission

The Symposium will be organized to give as much time to speakers for discussions. To stimulate discussion on the oral presentations, expert will be asked to present the latest developments in their field of expertise and to give his/ her views on the key issues raised.

For more information you can visit our website: <a href="http://www.icold2014bali.org/symposium">http://www.icold2014bali.org/symposium</a>

Eight pre-meeting and post-meeting study tours are proposed to make your visit to Bali still more interesting, combining gorgeous touristic views with the most interesting dams and water infrastructure built in Indonesia.

# **(% %)**

World Landslide Forum 3, 2 – 6 June 2014, Beijing, China, http://wlf3.professional.com

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08 - 11 June, 2014, Doha, Qatar

As 2014 marks a key year for underground works in Qatar, with projects such as the **Doha Metro, Doha Bay Sharq Crossing and IDRIS projects** entering critical stages, the market is becoming more competitive as tenders are being awarded.

The **4th Annual Underground Infrastructure & Deep Foundations Qatar** will once again provide a key forum for the stakeholders to assess the market opportunities and tackle the huge **technical** and **strategic challenges** involved in project delivery.

Qatar is planning to spend up to US\$205 billion on infrastructure between 2014 and 2018, however this is still unchartered territory for the country and much is at stake to deliver these high-profile projects in time for the 2022 World Cup.

With the help of our world-renowned expert Technical Advisors **Professor Harry Poulos** and **Professor Rolf Katzen -bach**, we have addressed the key geotechnical and engineering challenges in this year's agenda.

The programme combines the latest academic research with on-site project case studies to enable you to apply important lessons to the upcoming Doha underground projects.

#### Top 5 challenges in 2014 to be addressed:

- Tackling environmental restrictions on **dewatering** and how to **efficiently dispose of discharge**
- Examining innovations in **cavity management** and **soil testing** to deliver quality foundations, including how to improve risk assessment
- Discovering new and alternative methods for deep excavations and assessing the advantages and disadvantages
- Managing the huge logistical challenge of incurporating tunnels into existing underground infrastructure in Doha
- Effective planning of materials and workforce to avoid shortage and deliver projects in time for 2022 World Cup

Questions? Contact us on +971 4 364 2975 or email <u>en-</u> <u>quiry@iqpc.ae</u> now! © IQPC

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### http://www.iwm2014.org

The International Society for Micropiles (ISM) is a consortium of international representatives involved in the design, construction, research/development and instruction/promotion of micropile technology. ISM seeks to provide an international forum for debate, advice, problem-solving and support to micropile specialists and non-specialists throughout the world. Delegates of the Society can actively seek advice and experience from other delegates within this international group. In between formal society workshops, ISM delegates (and non-delegates) correspond on an adhoc basis, either one-to-one, or through the auspices of the ISM, to share problems, provide advice, discuss matters at issue, and generally provide a forum of all things micropile.

ISM aims to be respected internationally as the preeminent center of knowledge for the development, advancement and promotion of micropile technology

The International Workshop on Micropiles (IWM) group developed from its early days as an 8-member international review panel assembled in 1994 for the 4-volume FHWA-funded "State of Practice Review on Drilled and Grouted Micropiles" [prepared by Dr. Donald Bruce (Geosystems, L.P.) and Prof. Ilan Juran (Polytechnic University)]. Dr. Lizzi was an active, contributing member of this initial review panel. ISM was established in 2005 to further the work of the IWM as a professional organization. IWM and ISM have hosted a total of 11 workshops [Seattle, WA (1997); Ube, Japan (1999); Turku, Finland (2000); Venice, Italy (2002); Seattle, WA (2003); Tokyo, Japan (2004); Schrobenhausen, Germany (2006); Toronto, ON, Canada (2007); London, England (2009), Washington, DC (2010) and Milan, Italy (2012)], and one business meeting in Lille, France (2001). The ISM delegation comprises micropile contractors, designers, researchers, suppliers, manufacturers, and owners, who contribute to intense workshops on all aspects of micropile design, construction, testing, and research. The group has grown to a delegation of up to 100 active members from over 25 member countries committed to the advancement of micropile technology and use throughout the world.

In 2011, ISM formed a strategic alliance with ADSC: The International Association of Foundation Drilling, and DFI (Deep Foundations Institute). This alliance was pursued by ISM leadership to leverage extensive technical, administrative, and networking resources with these two influential industry organizations. Through this united front, all three organizations have better positioned themselves to address the global needs related to the micropile industry and further the pursuit of ISM's mission of being the preeminent worldwide center of knowledge for the development and advancement of micropile technology.

#### Highlights of this workshop include:

- State of the art presentations by leaders in the industry
- Technical sessions and breakout discussions on micropile research, design and construction issues
- Networking opportunities witch micropile practitioners from around the world
- Introduction of Lizzi Lecturer by Fedele Lizzi on his Father's Centennial Year
- 8th Lizzi Lecture: "TBD" delivered by Nadir Ansari of Ischerwood Associates, Canada
- 6th Lizzi Scholarship presentation and Award
- 1st World Cup of Micropile Competition Different Regions of the World will showcase their top Micropile projects and the Top Project will be selected by the delegates

#### More information:

#### **Dan Maclean**

Technical Program Chair 4502 Hanna Drive

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# Marry Ellen C. Bruce

Technical Lead 318 Walnut Drive Venetia, PA 15367, USA Tel.: +1 724 942 4220 Fax: +1 724 260 0582 Email: <u>mebruce@dfi.org</u>

# **03 80**

GeoHazards 6, June 15 – 18, 2014, Kingston, Canada, http://www.geohazards6.ca

# **(38 80)**

# ISSMGE Technical Committee 207 INTERNATIONAL CONFERENCE ON GEOTECHNICS Soil-Structure Interaction Underground Structures and Retaining Walls Saint Petersburg, 16-18 June 2014

# **Conference Topics**

- Soil-Structure Interaction
- Underground Structures and Retaining Walls
- Site Investigation as source of input parameters for Soil-Structure Interaction

#### **Conference Secretariat**

Eugene Dubinin <u>georec.spb@gmail.com</u> Elena Ukhina <u>eucantante@gmail.com</u> Tel. +7 905 259-40-90

#### Mailing Address

Georeconstruction Engineering Co. 190005 Russia, Saint Petersburg, Izmailovsky pr. 4 Phone/Fax +7 (812) 339-35-87 E-mail <u>georec.spb@gmail.com</u>, <u>lisyuk@gmail.com</u>

# **03 80**

8th European Conference "Numerical Methods in Geotechnical Engineering" NUMGE14, Delft, The Netherlands, 17-20 June 2014, <u>www.numge2014.org</u>

2<sup>nd</sup> International Conference on Vulnerability and Risk Analysis and Management & 6<sup>th</sup> International Symposium on Uncertainty Modelling and Analysis - Mini-Symposium Simulation-Based Structural Vulnerability Assessment and Risk Quantification in Earthquake Engineering, 13-16 July 2014, Liverpool, United Kingdom, http://www.icvram2014.org

GeoHubei 2014 International Conference Sustainable Civil Infrastructures: Innovative Technologies and Materials, July 20-22, 2014, Hubei, China http://geohubei2014.geoconf.org ICITG 2014 Second International Conference on Information Technology in Geo-Engineering, 21-22 July 2014, Durham, UK, <u>www.icitg.dur.ac.uk</u>

Second European Conference on Earthquake Engineering and Seismology, 24-29 August 2014, Istanbul, Turkey www.2eceesistanbul.org

TC204 ISSMGE International Symposium on "Geotechnical Aspects of Underground Construction in Soft Ground" - IS-Seoul 2014, 25-27 August 2014, Seoul, Korea, csyoo@skku.edu

International Symposium on Geomechanics from Micro to Macro (TC105), 01 - 03 September 2014, Cambridge, United Kingdom, <u>http://is-cambridge.eng.cam.ac.uk</u>

**(38 80)** 



http://www.hwm-conferences.tuc.gr

The International Conference on Industrial and Hazardous Waste Management "CRETE 2014" will be held in September  $2^{nd} - 5^{th}$ , 2014 at Chania (Crete, Greece) for the fourth time.

The Conference will once again focus on innovative aspects of Industrial and Hazardous Waste Management (including Organics, Non-Halogenated and Halogenated Solvents, Hydrocarbons, Pesticides, Explosives, PCBs, PCDDs/Fs, Heavy Metals, Asbestos, Nuclear Wastes, etc), presenting new technologies, describing the state of the art and related case studies, discussing the main controversial subjects, sharing experience among different countries, valuating social and financial balances. The Conference will include oral presentations, poster sessions, special sessions and workshops.

#### **CONFERENCE TOPICS**

During several sessions and special workshops, CRETE 2014 will mainly focus on:

- Regulation and Legislation
- IW & HW Production and Characterization
- Toxicology, Risk Assessment and LCA
- IW & HW Management Concepts, Minimization and Recycling
- IW & HW Collection, Transport, Storage and Treatment
- IW & HW Sludge Detoxification, Immobilization and Dewatering
- IW & HW Landfilling and Waste to Energy
- Special Waste Management: Mining, Military, Radioactive, Medical, Agro-Industrial, Wind Energy (recycling), etc.
- Special Residential Waste Management: WEEE, Old Cars, Old Tires, Special Household Waste, etc.
- Hazardous Disaster Waste
- Management of Contaminated Sites

### WORKSHOPS

• Energy from Industrial Waste

- Developments in Hazard Property Characterization Methods
- Asbestos Management
- Wind Energy Recycling
- WEEE: Hazardous & Valuable Materials
- Hospital Effluent: Characterization, management & environmental risk
- Resource Potential of Bottom Ash Landfills
- Innovations in Industrial Waste Management
- Hydrocarbon Waste Management

IW: Industrial Waste HW: Hazardous Waste

# **Conference Secretariat**

Technical University of Crete School of Environmental Engineering University Campus, 73100, Chania, Crete, GREECE Tel. +30 28210 37790 Fax. + 30 28210 37850 E-mail: <u>hwm.conferences@enveng.tuc.gr</u> Website: <u>http://www.hwm-conferences.tuc.gr</u>

# **03 80**

Geosynthetics mining solutions 2014, September 8 – 11, 2014, Vancouver, Canada, http://www.geosyntheticssolutions.com

JUBILEE CONFERENCE 50th Anniversary of Danube-European Conferences on Geotechnical Engineering Geotechnics of Roads and Railways, 9 - 11 September 2014, Vienna, Austria, <u>www.decqe2014.at</u>

IAEG XII CONGRESS Torino 2014 Engineering Geology for Society and Territory, IAEG 50th Anniversary, September 15-19, 2014, Torino, Italy, <u>www.iaeg2014.com</u>

10th International Conference on Geosynthetics – 10ICG, Berlin, Germany, 21 – 25 September 2014 <u>www.10icg-berlin.com</u>

14th International Conference of the International Association for Computer Methods and Advances in Geomechanics (14IACMAG), September 22 – 25, 2014, Kyoto, Japan, <u>www.14iacmaq.org</u>

14th World Conference of the Associated Research Centers for the Urban Underground Space (ACUUS 2014), September 24-26, 2014, Seoul, Korea http://acuus2014.com

EETC 2014 ATHENS 2nd Eastern European Tunnelling Conference, 28 September - 1 October 2014, Athens, Greece, www.eetc2014athens.org

International Congress Tunnels and Underground Space risks & opportunities, 13-15 October 2014, Lyon, France, www.congres.aftes.asso.fr/en/content/invitation

ARMS 8 - 8th ISRM Rock Mechanics Symposium, 14-16October2014,Sapporo,Japanwww.rocknet-japan.org/ARMS8/index.htm

9<sup>th</sup> International Conference on Structural Analysis of Historic Constructions, 14 – 17 October 2014, Mexico City, Mexico, <u>www.linkedin.com/groups/SAHC-2014-Mexico-City-</u> <u>3930057.S.213150607</u> IBSBI 2014 2<sup>nd</sup> International Conference on Bridges "Innovations on Bridges and Soil-Bridge Interaction" Athens, GREECE 16-18 October 2014

# 2<sup>nd</sup> International Conference Innovations on Bridges and Soil - Bridge Interaction Athens, 16 - 18 October 2014 <u>http://ibsbi2014.ntua.gr</u>

The **Hellenic Society of Bridges Study** is pleased to announce the **second IBSBI Conference**, "Innovations On Bridges And Soil-Bridge Interaction" **IBSBI 2014**, which will be held in Athens on 16, 17 and 18 October 2014.

During 2014 we will be celebrating the 3300 years of the construction of the oldest bridge in Europe, the Mycenaean Bridge of <u>Kazarma</u>.

# **CONFERENCE TOPICS**

- · Aesthetics and architecture of bridges
- Bridge monitoring
- Design methods
- Fabrication and construction
- High performance materials
- New materials and their application on bridges
- International codes on bridges and comparison-loadings
- Seismic behaviour
- Vehicle-bridge interaction
  - Old bridges and maintenance
  - Stone bridges
- Long-span bridges
- Special forms of bridges
- Floating bridges
- Pedestrian bridges
- Sky-bridges
- Geotechnical problems
- Soil-structure interaction
- Stability problems types and analysis
- Auxiliary and connected sub-structures
- Prefabrication
- Erection
- Computational techniques
- Experimental research
- Isolation and damping systems
- Aeroelasticity
- Impact and explosion problems
- Multi-hazard loading on bridges

Selected papers of high quality will be considered for publication in an extended form in the new **International Journal IJBE** after invitation (<u>http://www.ijbe.net</u>).

tel: +030 210 7722454, 7723443, 7721603

e-mail: ibsbi2014@ntua.gr

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# **CS 20**



# 1st International Conference on Volcanic Landscapes (VOLAND 2014) 16 - 18 October 2014, Santorini Island, Greece

Information Heliotopos Conferences Imerovigli, GR-84700 Santorini, Greece Phone: +30 2286024758, Fax: +30 2286023672 E-mail: <u>voland@heliotopos.net</u>

# **03 80**

1st International Conference on Discrete Fracture Network Engineering, October 19 - 22, 2014, Vancouver, British Columbia, Canada, <u>www.dfne2014.ca</u>

7th International Congress on Environmental Geotechnics, 10-14 November 2014, Melbourne, Australia, www.7iceg2014.com

#### **03 80**



# http://www.2014icse.com

Welcome to the 7th International Conference on Scour and Erosion (ICSE-7) and welcome to Perth, Western Australia. The ICSE conference series was initiated by the International Society for Soil Mechanics and Geotechnical Engineering (ISSMGE) in 2002 and is currently run by the Technical Committee TC213 (Scour and Erosion).

The first six conferences were successfully held in Texas, USA (2002), Singapore (2004), Amsterdam, The Netherlands (2006), Tokyo, Japan (2008), San Francisco, USA (2010) and Paris, France (2012). The objective of the conference is to provide a platform for scientists and engineers from various disciplines (e.g. Hydraulic and geotechnical engineering) to exchange ideas and report advances in research and practice on scientific and engineering challenges related to scour and erosion. The broad topics covered in ICSE conferences include fundamental mechanisms of erosion and scour, modelling (both physical and numerical) of erosion and scour processes and engineering applications that involve scour and erosion processes. The ICSE conferences have been well attended by scientists and engineers from broad areas such as Civil Engineering, hydraulic Engineering, Coastal and Offshore Engineering.

One of the strong features of the ICSE conferences has been the cross discipline collaborations and exchanges between geotechnical and hydraulic engineers. ICSE-7 will endeavour to maintain the traditions of the ICSE conferences and build on the success of the previous ICSE conferences.

You will find Perth, the Capital City of Western Australia a unique place to visit. I hope you will be able to join us and play your part in making the ICSE-7 a successful and memorable event.

# 03 80

Third Australasian Ground Control in Mining Conference2014,Sydney,www.mining.unsw.edu.au/node/608

Proceedings of the Institution of Civil Engineers, Geotechnical Engineering, THEMED ISSUE 2015, Construction processes and installation effects, Editors: Benoît Jones, University of Warwick, UK and Stuart Haigh, University of Cambridge, UK, <u>sarah.walker@ice.org.uk</u>

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# http://geosyntheticsconference.com

Geosynthetics 2015 is a must-attend trade show for geotechnical, civil and geo-environmental communities. Colocated with the <u>International Erosion Control Associa-</u> <u>tion</u> Environmental Connection Conference, this is where the industry unites to share developments in geosynthetics engineering and technologies.

The four-day event features more than 225 exhibits, plus a comprehensive program of <u>short courses</u>, panel discussions, <u>training workshops</u>, and <u>technical papers</u> presented by top industry experts. Buyers and sellers make qualified connections on the trade show floor and at receptions, luncheons and other valuable networking events.

Geosynthetics 2015 is organized by the <u>Industrial Fabrics</u> <u>Association International</u> and the <u>Geosynthetic Materials</u> <u>Association</u>, and is supported by the <u>North American Geo-</u> <u>synthetics Society</u> under the auspices of the <u>International</u> <u>Geosynthetics Society</u>.

Exhibiting and sponsorship opportunities are available to companies that market geotechnical products and services. Whether you attend or exhibit, we want you to get the most out of your trade show experience.

Technical Program Co-Chairs: James McKelvey III, P.E. Earth Engineering Inc. JayM@EarthEngineering.com



John McCartney Ph.D., P.E. University of Colorado at Boulder john.mccartney@colorado.edu

Secretary General: Barbara Connett Geosynthetics 2015 651 225 6914 \* 800 486 3980 bjconnett@ifai.com

# **(36 80)**

World Conference on Disaster Risk Reduction, 14-18 March 2015, Sendai City, Miyagi Prefecture, Japan, www.unisdr.org/we/coordinate/hfa-post2015

Innovative Geotechnics for Africa, 27 - 30 April 2015, Hammamet, Tunisia, Mehrez Khemakhem, <u>me-</u> <u>hrez.khemakhem@gmail.com</u>, <u>www.16cramsg.org</u>

# **(38 80)**



13<sup>th</sup> ISRM International Congress on Rock Mechanics Innovations in Applied and Theoretical Rock Mechanics 10 – 13 May 2015, Montreal, Canada <u>http://www.isrm2015.com</u>

The Congress of the ISRM "Innovations in Applied and Theoretical Rock Mechanics" will take place on 29 April to 6 May 2015 and will be chaired by Prof. Ferri Hassani.

#### Topics

- Application of geophysics in rock mechanics
- Enabled rock mechanics: scope of augmented reality, virtual reality and artificial intelligence
- Explosive free rock breakage techniques for rock excavation and drilling
- Fracture mechanics and fracture propagation
- Fractured rock and rock mass discontinuities
- Ground freezing
- High temperature geomechanics
- In-situ stress measurement
- Lab and in-situ rock characterization and modelling
- Numerical, analytical, constitutive modelling or rock
   processes
- Prediction and modelling
- Remote sensing and seismicity
- Reservoir geomechanics
- Rock mechanics risk assessment
- Rock physics models for enhanced hydrocarbon recovery
- Role of uncertainties in rock engineering design
- Slope stability and land slides

- Stability and excavation support
- Subsidence prediction and mitigation of its impacts
- Underground storage of petroleum, gas, CO<sub>2</sub>, and nuclear waste disposal

#### PLUS:

One day symposium on "Shale and Rock Mechanics as Applied to Slopes, Tunnels, Mines and Hydrocarbon Extraction" (ARMA & CARAM Initiative), Chaired by Herbert Einstein of MIT.

This one day event (symposium) is subdivided into four plenary sessions:

- Shale in Hydrocarbon Extraction
- Shale in Slopes
- Shale in tunnels and mines
- A debate on "Shale is a soft rock and not a hard soil"

Contact Person: Prof. Ferri Hassani Address: Department of Mining and Materials Engineering McGill University 3450 University, Adams Building, Room 109 Montreal, QC, Canada H3A 2A7 Telephone: + 514 398 8060 Fax: + 514 398 5016 E-mail: <u>ferri.hassani@cGill.ca</u>

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# World Tunnel Congress 2015 and 41st ITA General Assembly Promoting Tunnelling in South East European (SEE) Region 22 - 28 May 2015, Dubrovnik, Croatia <u>http://wtc15.com</u>

Contact ITA Croatia - Croatian Association for Tunnels and Underground Structures Davorin KOLIC, Society President Trnjanska 140 HR-10 000 Zagreb Croatia info@itacroatia.eu

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# 03 80

ISFOG 2015 3rd International Symposium on Frontiers in Offshore Geotechnics, Oslo, Norway, 10-12 June 2015, www.isfog2015.no

16<sup>th</sup> European Conference on Soil Mechanics and Geotechnical Engineering "Geotechnical Engineering for Infrastructure and Development", 13 - 17 September 2015, Edinburgh, UK, www.xvi-ecsmge-2015.org.uk

Workshop on Volcanic Rocks & Soils, 24 - 25 September 2015, Isle of Ischia, Italy, www.associazionegeotecnica.it



# **15th Pan-American Conference on** Soil Mechanics and Geotechnical Engineering 4 - 8 October 2015, Buenos Aires, Argentina panamericano2015@saig.org.ar

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**EUROCK 2015 ISRM European Regional Symposium** 64th Geomechanics Colloguy 7 - 9 October 2015, Salzburg, Austria

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# The 15th Asian Regional Conference on Soil Mechanics and Geotechnical Engineering 9-13 November 2015, Fukuoka, Japan http://www.15arc.org

The 15th Asian Regional Conference on Soil Mechanics and Geotechnical Engineering (15ARC) will be held under the auspices of the Japanese Geotechnical Society (JGS) in the City of Fukuoka, Kyushu, Japan on 9th - 13th of November 2015. The subtitle of this conference is "New Innovations and Sustainability" which indicates not only new technologies and methods in Geotechnical Engineering but also the sustainability of a better human life are the main topics of interest at this conference.

As many of you know, ISSMGE members are from both academia and those working in the field, and thus the fusion of those two members is one of the most important issues for sustaining our society. In this 15ARC, we will hold a special event called "Engineering Session Day". In addition, a discussion on the rehabilitation projects following mega disasters such as the 2011 Great Tohoku Earthquake will be featured as a work of collaboration involving groups from industry-government-academia.

The JGS has previously hosted ARC twice: once in Tokyo 1963 and once in Kyoto 1987. This means that over a quarter of a century has passed since the last conference was held in Japan. Therefore, all the JGS members take great pleasure in inviting all of ISSMGE members from Asia and all over the world to participate in 15ARC, Fukuoka, Japan in 2015. Finally, we hope that all participants will join the special event and sessions and have fruitful discussions on all kinds of geotechnical issues.

# **Conference Theme and Topics**

The recent geotechnical issues in Asia such as mitigation of natural disasters and the issues caused by rapid growth of industrialization may be leading topics worldwide and it is of great value to have these problems discussed by all the members in Asia. The organizing committee plans to include the following themes for consideration with the topics on the geotechnical engineering in Asia;

- 1. Characterization of soils
- 2. Local and problematic soils
- 3. Geo-disaster earthquake
- Geo-disaster rainfall
   Geo-disaster slope failure
- 6. Foundations
- 7. Underground construction and tunneling
- 8. Rock engineering
- 9. Dams and embankments
- 10. Geo-environmental engineering
- 11. Ground improvement and geo-synthetics
- 12. Geotechnical risk assessment and management
- 13. Forensic investigation
- 14. Innovative technologies for geotechnical applications including informatics
- 15. Case histories
- 16. Design and/or construction practice
- 17. Large scale projects related to geotechnical engineering

In addition to these themes, we are very concerned about the relationship between human resources in the Asian community and how to best continue our activities. Therefore, we would like to arrange some special events relating to younger and female researchers/engineers, such as special sessions with members from those groups including students.

# Secretariat

# 15ARC

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SIXTH INTERNATIONAL SYMPOSIUM ON DEFORMATION CHARACTERISTICS OF GEOMATERIALS IS Buenos Aires 2015 November 15th to 18th 2015 www.saig.org.ar/ISDCG2015

IS-Buenos Aires 2015 is prepared under the success of previous symposia: IS-Hokkaido 1994, IS-Torino 1999, IS-Lyon 2003, IS-Atlanta 2008, and IS-Seoul 2011. The conference will take place in parallel with the XV Panamerican conference on Soil Mechanics and Foundation Engineering.

This symposium focuses on understanding of the deformation properties of geomaterials before failure, and especially on pointing out the small strain shear modulus as a fundamental characteristic of geomaterials.

GOALS OF THE SYMPOSIUM

- Research and developments in advanced laboratory geotechnical testing, includingapparatus, techniques, data acquisition and interpretation.
- Applications of advanced laboratory and field testing to integrated site characterization and ground modelling.
- Demonstrating the value of practical engineering applications. This involves reporting collaborative studies on laboratory and field testing, sampling, theoretical and numerical analysis, project engineering and full scale observation.

# TOPICS

- *I. Experimental Investigations from very small strains to beyond failure Including Multiphysical Approach*
- 1) Advances in laboratory and field methods.
- 2) Data interpretation and geotechnical imaging.
- 3) Multi scale problems in geomechanics (micro-to-macro strain).
- 4) Advanced sampling.
- 5) HTCM coupling.
- II.Behaviour, characterization and modelling of various geomaterials and Interfaces
- 6) Physical and numerical modeling.
- 7) Anisotropy and localization.

8) Time dependent responses (ageing, viscous and cycling effects).

- 9) Special characteristics of particular geomaterials:
- Unsaturated soils.
- Cemented and stabilized soils including bituminous mixtures.
- Frozen soils including hydrates.
- Mixtures (soils with inclusions).
- Behaviour of interfaces with geomaterials.
- III.Practical prediction and interpretation of ground response: field observation and case histories
- 10) Integrated site characterization.
- 11) Performance evaluation of geotechnical structures.

12) New laboratory methods.

# CONTACTS

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# December 7-11, 2015, New Delhi (NCR), India

This International Conference is in continuation of the previous five such conferences organized by the Missouri University of Science & Technology, Rolla (US), under the chairmanship of Prof. Shamsher Prakash. All the conferences have proved to be highly successful events.

The Conference shall have invited Keynote Lectures, State of the Art & Practice (SOAP) lectures, Special Lectures and contributed original research papers for discussion and publication in the proceedings. Contributions are expected from over 40 countries.

# Themes

- "Dynamic Properties of Soil and Soil-Like Materials, Engineering Soil Parameters and Constitutive Relations"
- 1b. "New Field and Laboratory Methods and Results, Data Base, Large Scale Field Tests, Centrifuge Tests"
- 2. "Wave Propagation, Engineering Vibrations and Solutions, Vibrations of Machine Foundations, Blast, Traffic and Construction Vibrations, Vibration Absorption"
- 3a. "Engineering Seismology: Near Fault and Directivity Effects, Geologic Indicators of Rupture Direction, Geometric Effects on Ground Motions, Motion Parameters for Design, Borehole Arrays, Seismological and Strong Motion Arrays, Interpretation of Field Arrays Data, Site Amplification"
- 3b. "Local Site Effects: 1-D/2-D Wave Propagation Predictions and Measurements, Nonlinear versus Equivalent Linear Analysis, Effective Stress versus Total Stress Analysis"
- 4a. "Liquefaction and Seismically-Induced Settlement, Ground Failures, Seismic Studies of Kobe, Lima Peru, Chile, Pakistan, China, U.S. and other Recent Earthquakes, Spatial Liquefaction"
- 4b. "Stability and Displacement Performance of Slopes, Landfills and Earth Dams Under Earthquakes"
- 5a. "Soil-Structure Interaction and Dynamic Loading for both Shallow and Deep Foundations"
- 5b. "Soil-Foundation Interaction Triggered by Seismic Faulting"

- 6a. "Seismic Analysis and Design of Retaining and Marine Structures, Field Studies on Retaining Walls in California, Japan, India and other countries"
- 6b. "Seismic Hazard Zonation: Earthquake Risk Assessment with Earthquake Risk Management, Microzonation Projects and Procedures, Use of Building Codes to Reduce Earthquake Hazards"
- 7a. "Case Histories of Geotechnical Earthquake Engineering, Failures and Geotechnical Analysis of Recent Earthquakes, Reports of Recent Damaging Earthquakes"
- 7b. "Seismic Analysis and Retrofit of Foundations of Bridges and other Sub-Structures, Seismic Retrofit Projects and Procedures"
- "Model and Full-Scale Tests of Geotechnical Structures Including Centrifuge Tests, Recent Advances from Earthquake Simulation Facilities such as NEES, E-Defence, NCREE"
- 9. "Performance Based Design in Geotechnical Earthquake Engineering"

# **Conference Chair**

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# **Organizing Secretaries**

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# **03 80**

3<sup>rd</sup> PanAmerican Regional Conference on Geosynthetics 11-14 April 2016, Miami South Beach, USA <u>NAGSDirector05@gmail.com</u>

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84th ICOLD Annual Meeting May 2016, Johannesburg, South Africa NGM 2016 - The Nordic Geotechnical Meeting, 25 - 28 May 2016, Reykjavik, Iceland, <u>www.ngm2016.com</u>

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# **3rd ICTG International Conference on Transportation Geotechnics** 4 - 7 September 2016, Guimaraes, Portugal

The Transportation Geotechnics International Conference series began under the auspices of ISSMGE-TC 3 and was initiated in 2008 at the University of Nottingham, UK, as an International event designed to address the growing requirements of infrastructure for societies. The 2<sup>nd</sup> International Conference on Transportation Geotechnics took place in 2012, at Sapporo, Japan, under the ISSMGE-TC202 that follows the TC-3 activities for the period 2009-2013. To continue the successful of these conferences and the output of ISSMGE-TC-202, the 3<sup>rd</sup> was scheduled for 2016, at Guimarães, Portugal. Following the previous one, the challenges addressed by this conference will include a better understanding of the interactions of geotechnics on roads, rails, airports, harbours and other ground transportation infrastructure with the goal of providing safe, economic, environmental, reliable and sustainable infrastructures. The 3<sup>rd</sup> ICTG will be composed of workshops and several types of sessions, as well as a technical exhibition, to better disseminations of findings and best practices. A special attention will be paid to the publication of all the peer review papers, some of them in specialised international journals. On behalf of the organizing committee I am honoured to invite you to the 3rd ICTG in the City of Guimarães, UNESCO World Heritage (September 4-7, 2016).

Contact person: Prof. A. Gomes Correia (Chair) Address:University of Minho, School of Engineering, 4800-058, Guimarães, Portugal Phone: +351253510200 Fax: +351253510217 E-mail: agc@civil.uminho.pt

**CS 80** 

EuroGeo 6 – European Regional Conference on Geosynthetics 25 – 29 Sep 2016, Istanbul, Turkey <u>equier@boun.edu.tr</u>

**CS 80** 

6<sup>th</sup> Asian Regional Conference on Geosynthetics November 2016, New Delhi, India <u>uday@cbip.org</u>

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ΤΑ ΝΕΑ ΤΗΣ ΕΕΕΕΓΜ – Αρ. 63 – ΑΠΡΙΛΙΟΣ 2014



11<sup>th</sup> International Conference on Geosynthetics (11ICG) 16 - 20 Sep 2018, Seoul South Korea <u>csyoo@skku.edu</u>



# ΕΝΔΙΑΦΕΡΟΝΤΑ ΓΕΩΤΕΧΝΙΚΑ ΝΕΑ

# Amazing Flash Flood / Debris Flow Southern Utah HD

July 18th 2013. Massive debris flow / flash flood in Southern Utah. Close to 3" of rain fell north of my location and I filmed these shots 6+ hours after the fact.

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

# **08 80**

# Landslide in mine of Megalopolis Lignite Center in Greece



The landslide had a length of 1km and was caused by an adjacent fault on September 14, 2013. The fault was previously known and was being monitored by scientists.

According to <u>econews</u> the first geotechnical measurements and monitoring of the landslide started when the first cracks appeared on the 12<sup>th</sup> of September. The rapid evolution of the landslide event was confirmed and safety measures were taken. Few days later the landslide movement stopped and restoration works started. No one was injured. The landslide covered some of the excavators, rendering five of them not operational, according to the President of the Labor Centre of Arcadia Aristides Bourmas. The power plants remain operational in the unaffected parts of the Mines of Megalopolis Lignite Center.

See the embedded video under "Media" below this article.

https://www.youtube.com/watch?v=haMS8TqlhIA#t=105

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# **An Imperial Underworld**

A group of Italian caving enthusiasts, investigating a small hole in the ground concealed by bushes, discovered surprising information about the inner workings of ancient Rome's most impressive imperial residence. Hadrian's Villa is located in Tivoli, 15 miles east of Rome. Construction on the site began in A.D. 118, a year after Hadrian became emperor, and was completed a decade later. Some time ago, archaeologists realized that there was a network of roads under the estate, says Marco Placidi, director of Underground Rome, the group that made the discovery. "As we explored the roads, we discovered another world," he says. "The villa's grandeur is reflected underground."



Many parts of the estate, which once covered 600 acres, were designed by Hadrian himself, and were based on famous buildings in Egypt and in Greece. The site is organized like a city, complete with palaces, libraries, thermal baths, theaters, courtyards, and landscaped gardens watered by canals and fountains. In its day, the villa's subterranean world would have bustled with the activity of people charged with running the sprawling imperial palace as smoothly and quietly as possible. Tunnels and passageways allowed thousands of slaves to move discreetly from the basement of one building to that of another, enabled the movement of ox carts loaded with food and goods destined for underground storage, and accommodated sewers and water pipes. "These underground passageways have long been known," says Benedetta Adembri, the director of the site. But Placidi's team has discovered a new tunnel double the width-an astonishing 19 feet wide-of any previously found. This roadway would have allowed for two-way traffic.



Although the newly discovered tunnel is filled with debris nearly to the roof, the team, using a remote-controlled robot equipped with a camera, determined that it runs nearly straight, at least as far as the robot can go. "But," says Placidi, "we can only imagine where this new road ends."

Consisting of volunteer speleologists trained in archaeological research, Placidi's group has worked at Hadrian's Villa since 2001, thanks to an agreement with Italian heritage authorities. The team's results demonstrate that amateurs and archaeologists can collaborate successfully—so long as it is done carefully. "Sometimes amateurs can do damage, but that's not our experience. These volunteers are certified speleologists who scrupulously follow scientific protocol and work under the direction of our archaeologists," Adembri says. Given the lack of funding plaguing Italian archaeological projects, Placidi's group "provides valuable help, indeed," he adds. Adembri hopes to open part of the tunnels to guided tours this year.

(Rossella Lorenzi / ARCHAEOLOGY, Tuesday, October 15, 2013, <a href="http://archaeology.org/issues/110-1311/trenches/1398-tunnels-discovered-beneath-hadrians-villa">http://archaeology.org/issues/110-1311/trenches/1398-tunnels-discovered-beneath-hadrians-villa</a>)

BBC News <a href="https://www.youtube.com/watch?v=glRIawaSl4c">https://www.youtube.com/watch?v=glRIawaSl4c</a>

**(33 80)** 

# No more sand cone or nuclear density gauge!



Humboldt's Electrical Density Gauge (EDG) is a field testing device used to assess the moisture and density of compacted soils and evaluate the level of compaction of a compacted fill. The EDG can measure density, moisture content and percent compaction of soil. The device uses four darts, which are driven into the soil and used as electrodes to measure the dielectric properties of a soil to determine moisture level and density.

Prior to actual testing, the EDG should be calibrated to the material being tested by developing a Soil Model of the material. The Soil Model is performed by running tests on the material at varying levels of moisture and density. These same locations are also tested with an alternate device to determine the physical properties (moisture and density) which is then added to the EDG Soil Model. Proctor test results can also be added to the soil model, which provide percent compaction capabilities for the gauge. The more points developed in the soil model, the more accurate the gauge becomes. These Soil Models, or curves, are stored in the EDG and used as a reference for accurate testing. A Soil Model built today will still be useful anytime in the future when testing is to be performed on the same material. An ASTM standard (ASTM D7698) has been established, which outlines these procedures.

The EDG approach has significant advantages compared to other methods, such as the sand cone or the nuclear density gauge. Compared to the sand cone test method, the EDG is significantly less time consuming and has less chance for errors. Compared to the nuclear density gauge, the EDG requires less or similar manual effort. Less site preparation is required and once the darts are in place the actual test is performed within 20 seconds. The operator drives darts into the material to be tested, while the nuclear method requires a probe to be driven into the material. The darts for the EDG require less effort for removal than the nuclear gauge pin. The EDG also includes built-in "fuzzylogic" that will recognize when the material changes and will notify the operator so a different soil model may be used rather than assuming that one proctor fits a single site. Both the nuclear gauge and EDG are faster than the sand cone method and require a similar amount of time for each test as demonstrated in the video prepared by Humboldt:

http://www.youtube.com/watch?v=RKsABRD4mrM#t=86, also embedded under "Media" right below this article.

However, the biggest advantage of the EDG over the nuclear density gauge is that it does not have a nuclear source! Anyone who uses a nuclear density gauge knows about the level of effort, care, safety issues and strict regulations that need to be followed by its owner and operator. None of that is a concern with the EDG.

The new EDG comes with a lithium-ion battery that has 60hr life, and a car charger. It has also includes features such as a GPS, as well as USB and a blue-tooth technology for transferring data from gauge to supplied software in your PC for documentation of field tests.

More information on the EDG, can be found in the Humboldt website in this page: <u>http://www.humboldtmfg.com/edg.</u>

(Geoengineer, 15 October 2013)

**68 80** 

# Amazing video shows a bluff slope failure



The cliff is located near a narrow beach, along the Strait of Juan de Fuca, so large waves from the sea reach the slope often and weaken the bluff.

The top of the cliff consists of glacial drift-sediment and pre glacial alluvial sands and silts. The height of the collapsed section is the cause of the slide's volume which is captured in the video. Similar slides have occurred in the wider area due to the increased erosion rate.

See the failure in the embedded video under "Media" below this article.

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

(Geoengineer, Friday, 18 October 2013)

The "End of the World" viewpoint bluff along the Strait of Juan de Fuca west of Port Townsend, Wash., has been eroding. At about 6 p.m. Oct. 13, 2013 a section of the bluff just east of the old Army observation post fell. Port Townsend resident Kellie Henwood had just crossed the existing slide when the new landslide occurred. Video by Scott Wilson, Port Townsend & Jefferson County Leader.

**03 80** 



# Leaning Tower of Pisa is going straight

For centuries the Leaning Tower of Pisa has defied gravity – but now it seems it is losing some of its tilt.



The Tower of Pisa could finally be losing its tilt

Crews have spent 11 years at work to reinforce the foundation and stabilize Italy's Leaning Tower of Pisa, and it's paid off. The famous tilt of the structure has decreased by almost an inch, according to a scientific committee study, which found "that the bell tower is stable but tending to straighten." It will "continue to straighten another couple of millimeters and then stabilize before starting to lean again, but at a much slower rate than before," Giuseppe Bentivoglio, the monument's technical director, said.



Works have been going on for 11 years to reinforce the Tower's foundations

Now locals in the Tuscan town in Italy fear not so much a collapse – as the possibility that it will be too straight to bring in tourists.

(DAILY EXPRESS (LONDON) / October 29, 2013, http://www.express.co.uk/news/world/439793/Leaning-Tower-of-Pisa-is-going-straight)

# It's the STRAIGHTENING Tower of Pisa: Italian landmark loses 2.5cm of its famous tilt after £25m salvage project

# Stabilisation works have prevented further tilting AND made it more vertical

Its perilous incline has defied gravity since the 12th century.

But now the Leaning Tower of Pisa has lost some of its famous tilt, researchers have found.

An annual report on the monument's stability has revealed that the tower had spontaneously recovered some of its vertical incline-straightening by 2.5cm since 2001.

The straightening is not a miracle, but the long term effect of an 11-year restoration project completed in 2001.

Previously the 56m bell tower's tilt was increasing by more than a millimetre a year creating a danger that it could collapse altogether.

In 1993 it was leaning by 5.4m, compared to 3.8m in 1817 and just 1.4m in 1350.

The 14,500-tonne tower was shut for a decade while the foundations were reinforced and water was drained from beneath. Supporting steel cables were placed in circles around the structure.



Straightening up: Pisa's leaning tower before the stabilisation works in 1992 (L) and at the end of the works in 2010 (R). Since the works, the tower's tilt has decreased even more

After the  $\pm 25$ million project, the tower straightened itself almost immediately by 38cm.

The 2013 study by a scientific committee tasked with monitoring the celebrated building confirmed 'that the bell tower is stable but tending to straighten'.

Giuseppe Bentivoglio, technical director of the monument, said the tower's lean towards the south is shrinking.



The tour was reopened in 2011 without scaffolding for the first time in 20 years following the completion of the previous year's stabilising works

The structural engineer explained: 'The tower is moving. It is straightening towards the north. Between 2001 and 2013 it has recovered 2.5 cm of its incline.'

Mr Bentivoglio claimed the move was 'expected'.



The works included excavating under the tower in attempt to coax it gently back towards the vertical

'According to studies by researchers at Stuttgart University with whom we worked, the tower will continue to straighten another couple of millimetres and then stabilise before starting to lean again, but at a much slower rate than before.'



The tower's stabilising involved years of work, including emergency temporary steel cables, excavation of soil and digging wells to drain water He added: 'In theory it would be possible to straighten it completely.'



The Tower in 1934: Experts discovered that the Tower of Pisa was leaning more and more early last century

The tower's future is secure for another two- or three-hundred years, he said.

The prospect of losing Pisa's unique selling point will not sit well with locals.

The tower brings in six million visitors to Pisa every year with three million buying tickets to climb its eight floors. Mayor of Pisa, Marco Filippeschi said: 'The people of Pisa are delighted that the tower has been restored but not that it has been straightened.'

# THE TOWER WAS TILTING ALMOST FROM THE MO-MENT BUILDING BEGAN...



A view of Pisa's Piazza dei Miracoli (Miracles' square) in 2001. It had recently been opened to the public for the first time after being closed for more than a decade

The world-famous Tower of Pisa took nearly 200 years to build beginning with the foundations being laid in 1173.

The first stones were bought with 60 coins bequeathed by Donna Berta di Bernardo, a widow of a resident of the house of dell'Opera di Santa Maria, to the Opera Campanilis Petrarum Sancte Marie. These stones still form the base of the bell tower.

The white marble ground floor was built and it took until 1178 before the second floor was also completed.

By this time, however, the problem with the tilt was already apparent, and construction was stopped for almost a century - although this was mainly because the Republic of Pisa was constantly engaged in battles.

Some say the lengthy pause acted as a settling period for the existing structure, however, and the soft top soil is said to have levelled somewhat.

By 1198 the third floor was almost completed and works did not continue again until 1292, under architect Giovanni di Simone.

Giovanni is famed for giving the tower its curved shape, by building the upper floors with one side taller than the other, in an attempt to compensate for the tilt

He added another three levels before works were halted by more conflict - this time the in 1284 when the Pisans were defeated by the Genoans.

After another lengthy pause, construction resumed in 1319 by Tommasino di Andrea Pisano who added a bell for each of the seven notes of the musical scale.

And finally to upper bell chamber was finally added in 1372.

(Daily Mail, 28 October 2013, http://www.dailymail.co.uk/news/article-2478295/STRAIGHTENING-Tower-Pisa-Italian-leaninglandmark-loses-2-5cm-tilt.html?ico=home%5Eheadlines)

# **03 80**

# Immersed tunnel beneath Bosphorus Strait connects Europe and Asia



The submerged tunnel under the Bosphorus Strait opened on Tuesday, connecting the European and Asian shores of Istanbul. The railway tunnel is 13.6km (8.5miles) long and consists of a 1.4km long (0.87miles) immersed tunnel, a 9.8km (6miles) bored tunnel and a 2.4km (1.5miles) cutand-cover and open cut.

The tunnel is a part of the <u>Marmaray Project</u> for an upgraded 76km long railway system. According to Turkish officials, the immersed railway tunnel is the deepest of its kind at a depth of more than 55 meters, it will mitigate Istanbul's traffic and it can sustain even a 9.0 magnitude earthquake. Prefabricated elements were constructed in a dry dock, then towed to the site and were finally joined together on the seabed to complete the immersed tunnel. The rail system is expected to provide transportation for 1.5 million people every day, linking the two continents in about four minutes.

# Source: CNN, marmaray.com, MailOnline

# See the Marmaray Tunnel Construction in the embedded video under "Media" below this article.

https://www.youtube.com/watch?v=46Qp1W1M6YU

(Geoengineer, Thursday, 31 October 2013)

# **(38 80)**

# Interchange project in Wash. uses geofoam for road foundation Foam blocks used in Washington highway foundation



In this photo taken on Tuesday, Nov. 12, 2013, Washington State Dept. of Transportation crews use large blocks of geofoam to form the westside bridge approach to the new 139th Street overpass in Vancouver, Wash. WSDOT has used geofoam on a handful of projects in other parts of the state, said area engineer Leon Winger, but not in Southwest Washington.

As the forklift lurched toward a nearby truck, its prongs began to slide between two foam blocks loaded on the trailer. An unmistakable squeak followed, like Styrofoam being jammed into a cardboard box.

No, that's not packing material stacked up along Northeast 139th Street in Salmon Creek. It's the foundation for the road itself.

"They're not hugely different than what you would find wrapped around your TV when you open the box," said Andrew Fiske, a geotechnical engineer with the Washington State Department of Transportation.

Here's the key difference: "However, we can dictate the strength requirements," he said.

Those blocks are actually made of expanded polystyrene, commonly referred to as geofoam. The material is produced like packing foam, but made to be stronger, more dense and more uniform in its composition, he said.

Construction crews are using the relatively uncommon material at Clark County's Salmon Creek Interchange Project. The geofoam blocks will help hold up the approaches to a new bridge at Northeast 139th Street, plus new freeway ramps connecting to it. Crews are building the span as part of a \$133 million effort to remake the convergence of Interstate 5 and Interstate 205.

WSDOT has used geofoam on a handful of projects in other parts of the state, said area engineer Leon Winger, but not in Southwest Washington.

Several factors made the Salmon Creek project a good candidate for geofoam, Winger said. Soft, unstable soil on the site was among the biggest, he said.

"The ground is Jell-O underneath that," Winger said.

Using crushed rock or earthen fill to support the bridge approach would make it more prone to shifting or settling in an earthquake, Fiske said. So instead of strengthening the soil to hold a heavier load, crews simply made the load itself lighter, he said.

Gravel fill weighs about 130 pounds per cubic foot, Fiske said. A cubic foot of geofoam, by comparison, weighs about a pound and a half, he said.

Workers are using more than 31,000 cubic yards of geofoam on the Salmon Creek Interchange Project, according to WSDOT. It will take almost 8,000 geofoam blocks, most measuring 3 feet by 4 feet by 9 feet, to fill that space.

Once the foundation is set, workers will cut the foam to match the slope and shape of the road, Winger said. Sand and a rubber liner will help finish the structure. The road will sit on top, and concrete walls will enclose the entire foundation, he said.

"You'll never know that foam was ever part of the fill," Winger said. So, no squeaking.

The Salmon Creek Interchange Project is scheduled for completion next year. The new 139th Street bridge will give the area a second east-west thoroughfare, over the freeways, which WSDOT hopes will alleviate heavy traffic on nearby Northeast 134th Street.

Geofoam won't replace traditional fill in all cases, but it may become more common as construction projects become more conscious of seismic risks, Winger said.

"It's not a new technology," he said. "But it's a good solution."

(Eric Florip / The Columbian, November 13, 2013, http://www.thenewstribune.com/2013/11/13/2888980/foa m-blocks-used-in-washington.html)

# **03 80**

# Balcombe tunnel failure lessons revealed

Until it became synonymous with fracking, the Sussex village of Balcombe was more closely associated with a problematic rail tunnel, which partially failed in September 2011.

The Rail Accident Investigation Branch (RAIB) has now released its report into that incident and set out the lessons to be learned.

Early on the morning of Friday 23 September 2011, the crew of an engineering train passing through Balcombe tunnel observed that part of a large steel structure mounted in the roof of the tunnel, spanning over both rail-

way tracks, was sagging down. An emergency inspection found that on one side of the structure, three supports had become detached from the tunnel lining leaving a 12 metre length partially supported.



Balcombe tunnel

The structure, one of six within the tunnel, was intended to catch water dripping from the tunnel roof. It was supported by anchor studs fixed with polyester resin into holes drilled in the tunnel's brick lining. Within the tunnel, 18 studs (5%) were found to be missing and a further five studs were loose. The RAIB's investigation has found that this connection was inadequate because the resin was not compatible with the tunnel brickwork and may have been adversely affected by shrinkage and the damp conditions in the tunnel. It is probable that the resin was selected using inadequate technical data and probable that insufficient resin was placed around some studs.

Although some railway staff were aware that studs had fallen from the structure on more than one occasion since 2008, this did not result in appropriate risk mitigation.

This was because of inadequacies in the reporting of these events and because there was insufficient support for a member of railway staff who was managing some aspects of the tunnel maintenance but had limited experience. Inadequate access for tunnel examinations due to conflicting demands on the limited available access is considered to be an underlying factor.

The RAIB has identified three learning points from this incident: the need to consider the adequacy of information contained in manufacturer's data sheets; the need to maintain awareness of published information; and the benefit of marking significant tunnel defects such that they are visible from track level.

The RAIB has made nine recommendations addressed to Network Rail that focus on managing existing polyester resin connections and controlling the future use of this material; confirming the compatibility of materials during design work; effective responses to defects and abnormal events; competency of staff managing structures; access for examining structures; the examination process for structures in tunnels; and retention of records relating to structures.

- 1. Network Rail should, where failure could result in risk, identify where polyester resin anchors have been used to support structures (including overhead electrification and signalling equipment), and develop an appropriate regime to detect loose fixings including tactile testing where appropriate.
- 2. Network Rail should implement procedures to prevent the use of polyester resin anchors in circumstances where

dampness or shrinkage may affect the safe performance of an asset.

- 3. Network Rail should review, and if necessary amend its processes, such that designers of structures are required to positively confirm the compatibility of materials with their intended application and environment, including fixing metallic structures to masonry, if the application is safety critical.
- 4. Network Rail should review and, if necessary, modify the management arrangements that are now in place to provide an appropriate engineering response when structure defects are reported. This should include assessing the risk in the period prior to rectification, the means to verify that work requested has been carried out, and whether the reported defect is an indication of a wider problem.
- 5. Network Rail should undertake a comprehensive review and, if necessary, implement a time-bound plan to modify its levels of staffing and competency requirements so that all technical tasks associated with the management of structures are performed or checked in a timely manner by sufficiently qualified and experienced staff.
- 6. The intention of this recommendation is to improve the effectiveness of Network Rail's investigations when abnormal events are reported. Network Rail should revise its arrangements for the briefing of staff or contractors who are sent to investigate reported defects, so that all relevant available information is provided, and correct any deficiencies found in those arrangements.
- 7. Network Rail should review, and if necessary amend, its processes to include adequate safeguards such that sufficient track access is provided for the examination needs of all structures in a manner commensurate with the risk they pose to railway safety.
- 8. Network Rail should clarify arrangements, including its relationship with its contractors, for examining structures which are within tunnels, but are not fully encompassed by the normal tunnel management regime.
- 9. Network Rail should review, and if necessary improve, arrangements for recording, storing and retrieving data so that all relevant information is readily available to staff undertaking the examination, evaluation and maintenance of structures.

The full report can be seen here:

http://www.raib.gov.uk/latest news/news archive/news ar chive 2013/130815 pn balcombe tunnel.cfm

(The Construction Index (U.K.), 15 November 2013, http://www.theconstructionindex.co.uk/news/view/balcomb e-tunnel-failure-lessons-revealed)

# **(36 80)**

# Mexican coastal highway collapses (video)

Part of a picturesque toll highway that tourists use to travel between the Mexican towns of Ensenada and Tijuana collapsed this weekend, civil protection officials in Mexico said.

One of the holes created by the landslide was more than 40 feet deep and stretched 200 feet long.

A cement truck was stuck when the ground started shifting, but the driver made it out safely, officials told CNNMexico.

The truck ended up tumbling into the Pacific Ocean, which is just west of the road.



Officials say it may take as long as a year to repair the damage. Building a temporary road is one option being considered, authorities said. For now, motorists will use a nearby free road.

It is unclear what caused the landslide.

According to the United States Geological Survey, a magnitude-4.6 earthquake centered about 60 miles southeast of Ensenada struck on December 19, but the events might not be connected. On the Facebook page of the Baja California Civil Protection services, officials said the road is not in an area where there is a fault line.

The damage occurred about 60 miles from Mexico's border with the United States.

(Steve Almasy / CNN, December 30, 2013, http://edition.cnn.com/2013/12/29/world/americas/mexica n-highway-collapse/)

# ΕΝΔΙΑΦΕΡΟΝΤΑ -ΣΕΙΣΜΟΙ

# Underground Gas Injection Likely Contributed to Texas Earthquakes, Study Says

#### The findings mark the first time that carbon storage has been linked to temblors ranging from 3.0 to 4.4 in severity.

A method of storing harmful greenhouse gases by injecting them below ground has likely triggered a series of earthquakes in Texas, some larger than magnitude 3, a U.S. study said Monday.

The findings in the Proceedings of the National Academy of Sciences mark the first time that carbon storage has been linked to temblors ranging from 3.0 to 4.4 in severity.

Researchers warned last year in the same journal that <u>carbon capture and storage risked causing</u> <u>earthquakes</u>, but there had been no direct evidence of such quakes until now.

The study focused on seismic activity in petroleum fields in Scurry and Kent Counties in northwest Texas, known as the Cogdell and Kelly-Snyder oil fields.

A process called water flooding was used in the Cogdell field to boost oil production from 1957 to 1982, and previous research has found that the practice caused small quakes in the area from 1975 to 1982.

More recently, methane and  $CO_2$  have been injected into the oil field at high volumes, said the research by Wei Gan and Cliff Frohlich at the University of Texas at Austin's Institute for Geophysics.

It was done in an area where the U.S. Department of Energy has funded research on the potential impacts of carbon capture and storage (CCS), a proposed technique for reducing greenhouse gas emissions by capturing CO2 and injecting it deep underground for long-term storage.

# "Unusual and Noteworthy"

"The most significant result of this investigation is that gas injection may have contributed to triggering a sequence of earthquakes occurring since 2006 in and near the Cogdell field in Texas," said the study.

"This is an unusual and noteworthy instance where gas injection may have contributed to triggering earthquakes having magnitudes of 3 or larger."

There were 18 earthquakes of magnitude 3 or higher from 2006 to 2012, including a 4.4 earthquake on Sept. 11, 2011.

Of 93 quakes in the Cogdell area from March 2009 to December 2010, three during that time period were greater than magnitude 3.

# Water Injection Not a Factor, Researchers Say

Water injection could not have explained these quakes, which came after a period of 24 years in which no earthquakes were detected, the researchers said.

The study was funded by the U.S. Geological Survey and the National Natural Science Foundation of China.

The study said it remains "puzzling why there are no earthquakes in similar nearby fields such as the Kelly-Snyder field and the Salt Creek field."

Like the Cogdell field, those other areas have undergone years of sustained injection of water and extraction of oil, followed by recent increases in gas injection.

The study authors said it could be that there are geological faults in the Cogdell area that susceptible to activity under pressure, and that such faults may not exist in the nearby fields.

More detailed geological models are needed to further explain why some areas respond differently to gas injection than others.

(Agence France-Presse / Industry Week, Nov. 4, 2013, http://www.industryweek.com/environment/undergroundgas-injection-likely-contributed-texas-earthquakes-studysays)

#### **(3)** 80

# Texas study shows gas injection a probable suspect of creating earthquakes

The goal of the <u>study</u>, published last Monday in the science journal <u>Proceedings of the National Academy of Sciences</u>, was to investigate earthquakes greater than magnitude 3 of the period between 2006 and 2011.

To do so, data from oil, water and gas injection and extraction in the Cogdell oil field near Snyder, Texas were evaluated. Water injection for the improvement of oil production was the reason for previous earthquakes between 1957 and 1982. According to the results of the survey, water injection doesn't seem to have triggered the last period's quakes. However, the considerable amounts of gas injection including  $CO_2$  since 2004, as a method of storing harmful greenhouse gases, are most likely to have induced the tremors. As the authors of the study point out, the absence of similar earthquakes in adjacent fields indicates the contribution of geological faults in the Cogdell area. This is the first attempt to link earthquakes to carbon dioxide injections and further studies as well as geological models may help evaluate possible risks in climate change management.

(Geoengineer.org, Wednesday, 06 November 2013)

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It was done in an area where the U.S. Department of Energy has funded research on the potential impacts of carbon capture and storage (CCS), a proposed technique for reducing greenhouse gas emissions by capturing CO2 and injecting it deep underground for long-term storage.

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More detailed geological models are needed to further explain why some areas respond differently to gas injection than others.

(Agence France-Presse, Nov. 4, 2013,

http://www.industryweek.com/environment/undergroundgas-injection-likely-contributed-texas-earthquakes-studysays?page=1)

# Gas injection may have triggered earthquakes in the Cogdell oil field, Texas

#### Wei Gan and Cliff Frohlich

#### Significance

Between 2006 and 2011 a series of earthquakes occurred in the Cogdell oil field near Snyder, TX. A previous series of earthquakes occurring 1975–1982 was attributed to the injection of water into wells to enhance oil production. We evaluated injection and extraction of oil, water, and gas in the Cogdell field. Water injection cannot explain the 2006– 2011 earthquakes. However, since 2004 significant volumes of gas including  $CO_2$  have been injected into Cogdell wells. If this triggered the 2006–2011 seismicity, this represents an instance where gas injection has triggered earthquakes having magnitudes 3 and larger. Understanding when gas injection triggers earthquakes will help evaluate risks associated with large-scale carbon capture and storage as a strategy for managing climate change.

#### Abstract

Between 1957 and 1982, water flooding was conducted to improve petroleum production in the Cogdell oil field north of Snyder, TX, and a contemporary analysis concluded this induced earthquakes that occurred between 1975 and 1982. The National Earthquake Information Center detected no further activity between 1983 and 2005, but between 2006 and 2011 reported 18 earthquakes having magnitudes 3 and greater. To investigate these earthquakes, we analyzed data recorded by six temporary seismograph stations deployed by the USArray program, and identified 93 well-recorded earthquakes occurring between March 2009 and December 2010. Relocation with a double-difference method shows that most earthquakes occurred within several northeast-southwest-trending linear clusters, with trends corresponding to nodal planes of regional focal mechanisms, possibly indicating the presence of previously unidentified faults. We have evaluated data concerning injection and extraction of oil, water, and gas in the Cogdell field. Water injection cannot explain the 2006-2011 earthquakes, especially as net volumes (injection minus extraction) are significantly less than in the 1957-1982 period. However, since 2004 significant volumes of gases including supercritical CO<sub>2</sub> have been injected into the Cogdell field. The timing of gas injection suggests it may have contributed to triggering the recent seismic activity. If so, this represents an instance where gas injection has triggered earthquakes having magnitudes 3 and larger. Further modeling studies may help evaluate recent assertions suggesting significant risks accompany large-scale carbon capture and storage as a strategy for managing climate change.

(http://www.pnas.org/content/early/2013/10/31/13113161 10.abstract)

# **68 80**

# Earthquake 'Autopsy' Helps Shine Light on Aftershocks

An incredibly detailed look at Earth's twitches and shudders after a magnitude-8.8 earthquake in Chile reveals a potential new trigger for aftershocks, the smaller temblors that follow an earthquake.



GPS measurements show how the crust shifted after a magnitude-8.8 earthquake in Chile in 2010.

The findings, published Dec. 1 in the journal Earth and Planetary Science Letters, come from a massive research effort to conduct an earthquake "autopsy" in Chile.

The Feb. 27, 2010, Maule earthquake struck offshore, on a subduction zone where the Nazca tectonic plate crashes into and dives under the South American tectonic plate. The two plates slid past each other by up to 50 feet (16 meters) in some spots.

After the earthquake, researchers set out 67 GPS stations and seismic monitoring equipment to track subtle shifts in the Earth's crust. Such surface changes hint at what is happening deep below, in the subduction zone, where the plates are adjusting to their new positions. The monitoring revealed the subduction zone slipped another 6.5 feet (2 meters) in the 420 days following the earthquake. And the fault (the thin zone where the two plates meet) moved in pulses in various places, rather than sliding as one continuous zone, the researchers found. For example, the region around Chile's Arauco Peninsula drifted less than the fault did farther to the south, with some spots varying by more than 40 inches (100 centimeters).

But to their surprise, the researchers discovered the fault zones with the biggest post-earthquake slip didn't match up with the regions that had the most intense aftershocks. Instead, the biggest fault shifts happened silently, the team said in a statement. "Areas with large stress transfer do not correlate with aftershocks in all magnitude classes as hitherto assumed," Jonathan Bedford, lead study author and a researcher at the Helmholtz Center GeoForschungsZentrum Potsdam in Germany, said in a statement.



An illustration of the subduction zone offshore of Chile, where a magnitude-8.8 earthquake struck in 2010 near Maule.

Aftershocks have been thought to result from Earth's crust responding to added stress from earthquakes. However, the new findings suggest a different process may also be at work, at least in the Chilean subduction zone, the researchers said.

"Our results suggest that the classic view of the stress relaxation due to aftershocks are too simple," Bedford said.

Bedford and his colleagues said that fluids pushing into the fault zone along fractures opened during the main earthquake could trigger aftershocks. This would create an aftershock pattern that is independent of the surface changes caused by earthquakes, as seen in the new study, the researchers said.

(Becky Oskin / LiveScience.com, December 2, 2013, http://www.livescience.com/41618-earthquakesaftershocks-chile-subduction-zone.html)

# **68 80**

# Προσοχή, ἑδαφος ολισθηρό Αποκαλυπτική αυτοψία στο ρήγμα του ιαπωνικού τσουνάμι

Ερευνητική γεώτρηση κάτω από τον Ειρηνικό Ωκεανό, στην περιοχή όπου συναντώνται δύο τεκτονικές πλάκες, αποκαλύπτει τις γεωλογικές ιδιοτροπίας που πυροδότησαν το φονικό ιαπωνικό τσουνάμι του 2011: οι δύο γιγάντιες πλάκες χωρίζονταν από ένα ολισθηρό στρώμα αργίλου πάχους μόλις 5 μέτρων.

Κανένα ωκεανογραφικό σκάφος δεν μπορεί να φτάσει βαθύτερα από το ιαπωνικό γεωτρητικό πλοίο Chikyu, του οποίου τα δεδομένα τροφοδότησαν τέσσερις επιμέρους μελέτες που δημοσιεύονται αυτή την εβδομάδα στο Science.

Ο σεισμός των 9 βαθμών που πυροδότησε το τσουνάμι στις 11 Μαρτίου 2011, ο ισχυρότερος που έχει πλήξει ποτέ την Ιαπωνία, εκδηλώθηκε σε μια «ζώνη υποβύθισης», το όριο όπου η τεκτονική πλάκα του Ειρηνικού γλιστρά κάτω από μια γειτονική πλάκα.

# ΤΑ ΝΕΑ ΤΗΣ ΕΕΕΕΓΜ – Αρ. 63 – ΑΠΡΙΛΙΟΣ 2014



Το γεωτρύπανο του Chikyu καταδύθηκε 7 χιλιόμετρα στον Ειρηνικό και τρύπησε το βυθό σε βάθος ενός χιλιομέτρου (Πηγή: IODP/JAMSTEC)

Η δόνηση ήταν στην πραγματικότητα δύο σεισμοί σε έναν, εξηγεί ο δικτυακός τόπος του περιοδικού Nature. Ένας συνηθισμένος, βαθύς σεισμός κοντά στο επίκεντρο, και ένας παράξενος ρηχός σεισμός που εκδηλώθηκε αμέσως μετά και προκάλεσε μετατόπιση του βυθού κατά 50 μέτρα προς τα πλάγια. Η μετατόπιση, με τη σειρά της, προκάλεσε ένα από τα μεγαλύτερα τσουνάμι στη σύγχρονη ιστορία.

Το γεωτρύπανο του ωκεανογραφικού σκάφους Chikyu καταδύθηκε 7 χιλιόμετρα στον Ειρηνικό και τρύπησε το βυθό σε βάθος ενός χιλιομέτρου. Η έρευνα αποκάλυψε ότι οι δύο τεκτονικές πλάκες χωρίζονται από ένα στρώμα αργιλώδους λάσπης πάχους μόλις πέντε μέτρων.

«Αυτό είναι παράξενο. Συνήθως έχει πάχος αρκετών δεκάδων μέτρων» σχολίασε η Έμιλι Μπρόντσκι του Πανεπιστημίου της Καλιφόρνια στη Σάντα Κρουζ, η οποία συμμετείχε σε τρεις από τις τέσσερις μελέτες.

Επιπλέον, εργαστηριακές μελέτες έδειξαν ότι το στρώμα αργίλου ήταν άκρως ολισθηρό, και μάλιστα έγινε ακόμα πιο ολισθηρό όταν η πίεση αυξήθηκε απότομα, καθώς το νερό που περιείχε η λάσπη προσπάθησε να δραπετεύσει καθώς δεχόταν την πίεση.

Οι μελέτες θα μπορούσαν τώρα να βοηθήσουν στην κατανόηση αυτού του ρήγματος που απειλεί την Ιαπωνία, καθώς και άλλων ζωνών υποβύθισης που περιέχουν τέτοια στρώματα αργίλου.

Ένα από τα ρήγματα στα οποία θα μπορούσαν να αξιοποιηθούν τα νέα στοιχεία για την ολίσθηση ρηγμάτων κάτω από μεγάλες πιέσεις είναι το διαβόητο ρήγμα του Αγίου Ανδρέα, μια διαχρονική απειλή για το Λος Άντζελες και το Σαν Φρανσίσκο.

(Newsroom ΔΟΛ, 06 Δεκ. 2013, <u>http://news.in.gr/science-technology/article/?aid=1231278861</u>)

# Report

# Structure and Composition of the Plate-Boundary Slip Zone for the 2011 Tohoku-Oki Earthquake

Frederick M. Chester, Christie Rowe, Kohtaro Ujiie, James Kirkpatrick, Christine Regalla, Francesca Remitti, J. Casey Moore, Virginia Toy, Monica Wolfson-Schwehr, Santanu Bose, Jun Kameda, James J. Mori, Emily E. Brodsky, Nobuhisa Eguchi, Sean Toczko, Expedition 343 and 343T Scientists

# ABSTRACT

The mechanics of great subduction earthquakes are influenced by the frictional properties, structure, and composition of the plate-boundary fault. We present observations of the structure and composition of the shallow source fault of the 2011 Tohoku-Oki earthquake and tsunami from boreholes drilled by the Integrated Ocean Drilling Program Expedition 343 and 343T. Logging-while-drilling and coresample observations show a single major plate-boundary fault accommodated the large slip of the Tohoku-Oki earthquake rupture, as well as nearly all the cumulative interplate motion at the drill site. The localization of deformation onto a limited thickness (less than 5 meters) of pelagic clay is the defining characteristic of the shallow earthquake fault, suggesting that the pelagic clay may be a regionally important control on tsunamigenic earthquakes.

#### **Deep Drilling for Earthquake Clues**

# EDITOR'S SUMMARY

The 2011  $M_w$  9.0 Tohoku-Oki earthquake and tsunami were remarkable in many regards, including the rupturing of shallow trench sediments with huge associated slip (see the Perspective by **Wang and Kinoshita**). The Japan Trench Fast Drilling Project rapid response drilling expedition sought to sample and monitor the fault zone directly through a series of boreholes. **Chester** *et al.* (p. 1208) describe the structure and composition of the thin fault zone, which is predominately comprised of weak clay-rich sediments. Using these same fault-zone materials, **Ujiie** *et al.* (p. 1211) performed high-velocity frictional experiments to determine the physical controls on the large slip that occurred during the earthquake. Finally, **Fulton** *et al.* (p. 1214) measured in situ temperature anomalies across the fault zone for 9 months, establishing a baseline for frictional resistance and stress during and following the earthquake.



**Fig. S5.** The plate-boundary décollement in the Nankai subduction zone. (**A**) Map of the Nankai Trough offshore southwest Japan. The red line indicates the orientation of seismic reflection line in Fig. S5B. (**B**) Seismic reflection profile of the Nankai accretionary prism showing the location the plate-boundary décollement, the megasplay fault, and the drill site C0007. The seismic data and interpretation are derived from *30*.

(Science 6 December 2013: Vol. 342 no. 6163 pp. 1208-1211, DOI: 10.1126/science.1243719, http://www.sciencemag.org/content/342/6163/1208)



# Killer qualities of Japanese fault revealed

Ocean drilling finds thin, weak layer of clay was behind giant earthquake and tsunami of 2011.



The deep-sea drilling vessel *Chikyu* investigated the nature of the seismic fault that shook Japan in 2011, triggering the giant tsunami that led to the meltdown of three nuclear reactors at the Fukushima Daiichi power plant.

The devastating 2011 earthquake and tsunami in Japan shocked researchers who did not expect that the seismic fault involved could release so much energy. Now the world's deepest-drilling oceanographic ship has been able to pin down the odd geology that made this disaster so horrific.

The fault turns out to be unusually thin and weak, the researchers report in Science this week<sup>1-3</sup>. The results will help to pin down whether other offshore faults around the world are capable of triggering the same scale of disaster.

"If this kind of thing is more common than thought, we have to rethink our risk assessments," says Kelin Wang at the Geological Survey of Canada in Victoria, who was not involved with the new study.

The magnitude-9 Tohoku-Oki earthquake of 11 March 2011 was really two quakes in one: a conventional, deeper quake near the epicentre that caused the ground to shake; and an odd, shallow quake further out to sea that caused an astonishing, record-breaking 50 metres of sideways land slip. It was this displacement of the sea floor that kicked up a massive tsunami. In the textbook version of so-called 'subduction zones', where an oceanic plate dives under another tectonic plate, as it does in this area, the shallow portions near the sea floor should be resistant to slipping: as the soft sediments move, friction is meant to build up and stop further sliding. But in this case, the slip was severe.

In an attempt to understand why, a team of researchers quickly put together the Japan Trench Fast Drilling Project. They enlisted a Japanese research ship, the *Chikyu*, which drilled nearly 1 km deep into the sea floor under nearly 7km of water. After some initial technical problems, the team managed to extract a core from the fault in May 2012, and to install temperature sensors in one of the boreholes in the following July.

# Slippery clay

The coring revealed a very thin clay layer, about 5 metres thick, separating the two sliding tectonic plates<sup>1</sup>. "That's just weird," says Emily Brodsky of the University of California, Santa Cruz (UCSC), who is an author on all three *Science* papers this week. "Usually it's tens of metres or more." Lab tests confirmed that this wet clay layer is extremely slippery, and gets even more so under stress<sup>2</sup>.

As sliding creates friction and heat, water in the clay gets pressurized and pushes up against the impermeable rock around it. That "jacks open the fault" says Brodsky, allowing it to slip even more.

The <u>temperature sensors</u> found that more than a year after the quake, the fault was still up to 0.31 °C warmer than its surroundings<sup>3</sup>. From this they could extrapolate how much heat was generated from friction during the sliding event. Their calculations confirmed the very low friction of the 5metre-thick clay layer.

"The rule of thumb is that fault-zone rocks have a friction six to eight times greater than what we see here," says Brodsky. "That's a big deal." Wang confirms that the finding is odd: "What's surprising is that this is the friction during a quake," he says, a time when the textbooks say that friction should be higher, not lower, than normal. It's reassuring that all three lines of evidence — the core, the lab work, and the temperature sensors — all give the same friction results, says Brodsky. "Any one of them might lead you to say 'that's a weird result'. All together, you start to believe it."

#### **Common fault**

The results mesh with a theoretical model, published by *Nature* this January, which proposed how supposedly-sticky faults might overcome their supposed resistance to sliding<sup>4</sup>. It too suggested that fluid pressure could make such faults — including the middle section of the San Andreas fault in California — capable of giant slips.

And does the same odd geology appear in offshore faults elsewhere, making them capable of producing giant waves? It could, says Casey Moore, also at UCSC and an author on the new work. "There's a lot of clay in the ocean," he says. Alaska, Indonesia and South America could theoretically have similar clay layers, he says, although there have not been enough boreholes drilled to find out.

Only a handful of underwater faults are within reach of drill ships: researchers have so far breached faults in Barbados, at the Nankai trough further south in Japan, and in Costa Rica. The Nankai trough, in particular, has a very different geology to the Tohoku fault. Says Brodsky: "At least, we now know what to look for."

(Nicola Jones / *Nature*, 05 December 2013, doi:10.1038/nature.2013.14316, <u>http://www.nature.com/news/killer-qualities-of-japanese-fault-revealed-1.14316</u>)

#### 03 80

# Mapping the shake, rattle and slip of tectonic plates Seismologists can track earthquakes faster, and in more detail, than ever before

These days, earthquakes look a lot different to Gavin Hayes. Instead of black-and-white seismographic spikes, Hayes and his fellow seismologists at the United States Geological Survey National Earthquake Information Center plot aftershocks as colorful pinpoints on the 3-D gridlines of a computer screen. Using digital maps and models allows them to better study the subsurface mechanisms that cause an earthquake and inform response teams of its severity faster than ever before.



Digital tools like this map help earthquake researchers quicken response to major disasters [Image credit: Gavin Hayes, USGS]

"The [National Earthquake Information Center] has had to change how it communicates earthquakes," Hayes said to seismologists and citizen scientists during a talk in September at the American Museum of Natural History in New York City. The federal government requires the information center in Golden, Colo., to publicly report earthquakes above magnitude 2 to 3 — those that people can feel — in the U.S., as well as slightly stronger shakes felt around the world. Ten years ago, the information center used to only publish magnitude, location and an analysis of how the fault, or break in the earth's crust, had shifted in each quake. Now, the researchers roll out a full "suite of products" including maps and models of what happened beneath the surface. The newest tools help answer critical questions such as: Where is the most damage? Where are the most deaths? Will international aid be needed?

When an earthquake occurs, a modeling software called ShakeMaps

(http://earthquake.usqs.qov/earthquakes/shakemap/) uses factors such as distance to the epicenter and depth, recorded on seismometers, to plot shaken areas on a scale from green to orange to red. The closer to red, the worse the shaking, which typically means greater damage.

Then, the PAGER system (Prompt Assessment of Global Earthquakes for Response, http://www.usgs.gov/faq/?q=categories/9837/3388) matches the ShakeMap against population density to find severely shaken areas with a lot of people. Those are the areas where injuries and fatalities most likely occurred. PAGER also assigns a color to the quake based on whether it might require a regional, national or international response.

Hayes said his colleagues can turn this information around faster than ever before, which could mean shorter response times by governments, emergency personnel and aid agencies. It took nearly an hour and a half for the National Earthquake Information Center to announce the magnitude of an earthquake that rocked Sumatra, Indonesia, in 2004. Seven years later, it announced the magnitude in just 20 minutes for a temblor in Tohoku, Japan. Other information that once took a day or more to release — such as damage estimates and a model showing the slip along a fault line — is now published within the hour.

Seismologists know that the faster they hear about a quake, the faster they can publish the details. So they scan for earthquake-related tweets, which can point them to a new event even faster than seismometers in some cases. Hayes' team also asks users to report earthquakes using a questionnaire on the information center's website

(http://earthquake.usgs.gov/regional/neic/) called "Did You Feel It?" (http://earthquake.usgs.gov/earthquakes/dyfi/). For one earthquake (http://www.usgs.gov/blogs/features/usgs\_top\_story/oneyear-anniversary-magnitude-5-8-virginia-earthquake/) in Virginia, 148,000 people from Florida to Canada logged in to report that they had.

Scientists at the information center are also using digital tools to aid in earthquake preparedness. Before an earthquake strikes, they can create rupture models to simulate shaking and identify potential hazards, like buildings which might not hold up to a hard shake, using "what if?" scenarios based on hypothetical earthquakes that could someday hit a region. This holds practical potential, said Brian Tucker, a seismologist and president of GeoHazards International (http://geohaz.org/), a non-governmental organization that helps communities prepare for earthquakes. Tucker has used these models to point out the need for reinforced infrastructure in Haiti, India and Bhutan in Asia. "This has been very helpful in raising awareness of the current risk," Tucker said, "and in prioritizing what buildings and areas of the city should receive attention."

In the future, these models could also prove useful following an earthquake, said Ricardo Taborda, civil engineer at the Center for Earthquake Research and Information (http://www.memphis.edu/ceri/) at University of Memphis. Taborda produces hypothetical large-scale earthquake models like those at the National Earthquake Information Center. "We hope that in the future, an earthquake happens and within 24 hours we produce an approximate simulation of what occurred so we can distribute resources," Taborda said. As the technology advances, the window of time between an earthquake and its simulation will get smaller and smaller. "We hope that we will be able to really have a rapid response based on this kind of modeling."

The benefits of this work could someday be measured in lives, as scientists expect earthquakes of the coming decades to set new records (http://www.sciencedirect.com/science/article/pii/S004019 5112001783) for deaths and economic loss. Exploding populations in developing countries are cramming into fastgrowing and densely packed cities (http://www.sciencemag.org/content/341/6150/1070.sum mary), which do not always enforce modern building codes and carry greater risks than those in developed nations. "Mother Nature is very clever about targeting these populations in the worst conditions," Taborda said.

That's precisely why researchers at the National Earthquake Information Center are so intent on using information technologies to mitigate the impact of major earthquakes. If tracking tweets and tweaking software can slow or reverse the expected rise in fatalities from earthquakes around the world, and especially in developing countries, then seismologists will have found a way to use the technology of the 21st century to temper, at least in part, its growing risks.

What should you do in an earthquake? The National Earthquake Information Center recommends you "drop, cover and hold on" (http://www.shakeout.org/dropcoverholdon/) if you're caught in an earthquake. In the United States, you're much more likely to be injured by a falling object than a collapsed building. Drop to the ground, crawl under a heavy object like a table or bed and ride out the shaking. Read more safety tips (http://www.earthquakecountry.info/downloads/ShakeOut Recommended Earthquake Safety Actions.pdf) for what to do if a quake strikes while you're in bed, in a grocery store or driving down the road. (Amy Nordrum / Science Line, December 23, 2013, http://scienceline.org/2013/12/mapping-the-shake-rattleand-slip-of-tectonic-plates/) είναι ότι το συμβάν του 2004 δεν είναι απαραίτητο να μην επαναληφθεί τα επόμενα 500 χρόνια».

(Newsroom ΔΟΛ, με πληροφορίες από Associated Press, 24 Δεκ. 2013, <u>http://news.in.gr/science-</u> technology/article/?aid=1231283227)

# **(3 N**)

# Το τσουνάμι της Ινδονησίας δεν μπορεί παρά να επαναληφθεί Σπηλιά με ντοκουμέντα



Στο δάπεδο αυτής της σπηλιάς στην επαρχία Άτσεχ βρέθηκαν τα αποτυπώματα 11 τσουνάμι

Η ανακάλυψη μιας σπηλιάς που κατακλύζεται με νερό σε κάθε τσουνάμι φέρνει άσχημα νέα για τη Σουμάτρα της Ινδονησίας: το φονικό τσουνάμι του 2004 δεν μπορεί παρά να επαναληφθεί σε μερικούς αιώνες, ή ακόμα και σε λίγες δεκαετίες.

Η σπηλιά από ασβεστόλιθο ανακαλύφθηκε γύρω στα 200 μέτρα από την ακτή της επαρχίας Άτσεχ στο δυτικό άκρο του νησιού της Σουμάτρας. Βρίσκεται πάνω από το επίπεδο της πλημμυρίδας και προστατεύεται από τις καταιγίδες. Μόνο τα μεγάλα κύματα που φτάνουν βαθιά μέσα στην ενδοχώρα μπορούν να περάσουν στη σπηλιά και να αφήσουν αποθέσεις άμμου.

Ερευνητές του Τεχνολογικού Πανεπιστημίου της Νανιάνγκ στη Σιγκαπούρη ανακάλυψαν στρώματα θαλασσινής άμμου που αποτέθηκαν στο δάπεδο της σπηλιάς σε βάθος χιλιετηρίδων. Τα στρώματα αυτά δεν ήταν συνεχόμενα, αλλά ξεχώριζαν μεταξύ τους χάρη στα περιττώματα των νυχτερίδων που ζουν στη σπηλιά.

Και η χρονολόγηση οστράκων και άλλων νεκρών οργανισμών στις αποθέσεις αποκάλυψε μια μακρά ιστορία καταστροφής που καλύπτει διάστημα 7.500 ετών και περιλαμβάνει 11 μεγάλα τσουνάμι πριν από το 2004.

Τα μεσοδιαστήματα δεν ήταν σταθερά: το τελευταίο τσουνάμι συνέβη πριν από 2.800 χρόνια, ωστόσο στους πέντε αιώνες που είχαν προηγηθεί το φαινόμενο επαναλήφθηκε τέσσερις φορές.

Θα περίμενε κανείς ότι το ρήγμα που προκάλεσε το σεισμό των 9,1 βαθμών και το τσουνάμι των 30 μέτρων το Δεκέμβριο του 2004 θα χρειαζόταν αρκετούς αιώνες για να συσσωρεύσει αρκετή ενέργεια και να προκαλέσει νέα δόνηση.

Η νέα μελέτη, η οποία παρουσιάστηκε νωρίτερα αυτό το μηνα στο συνέδριο της Αμερικανικής Ένωσης Γεωφυσικής στο Σαν Φρανσίσκο, καθιστά σαφές ότι αυτή η αισιοδοξία δεν δικαιολογείται. Όπως σχολίασε ο Τσαρλς Ρούμπιν, επικεφαλής της μελέτης, «το μήνυμα που πρέπει να κρατήσει κανείς

# ΕΝΔΙΑΦΕΡΟΝΤΑ -ΠΕΡΙΒΑΛΛΟΝ

# Carl Sagan - Χλωμή Μπλε Κουκκίδα Ένα video που διδάσκει πολλά!



Η Χλωμή Μπλε Κουκκίδα είμαι μια φωτογραφία της Γης που τραβήχτηκε το 1990 από το Voyager 1 από απόσταση ρεκόρ, δείχνοντας αμυδρά τον πλανήτη μας μέσα στο αχανές διάστημα. Μετά από αίτημα του Carl Sagan το Voyager, καθώς εγκατέλειπε το ηλιακό μας σύστημα, έστρεψε για μια τελευταία φορά τις κάμερες προς τη Γη, τραβώντας τη φωτογραφία, από την οποία εμπνεύστηκε ο τίτλος του ομότιτλου βιβλίου.

"Το διαστημικό σκάφος ήταν πολύ μακριά από το σπίτι. Σκέφτηκα ότι θα ήταν καλή ιδέα, αμέσως μετά τον Κρόνο, να φροντίσουμε να λάβει μια τελευταία ματιά πίσω. Από τον Κρόνο, η Γη φαίνεται πολύ μικρή για το Voyager: Ο πλανήτης μας θα ήταν ένα σημείο φωτός, ένα μοναχικό pixel, που δύσκολα διακρίνεται από τα άλλα σημεία φωτός του Voyager: ...μια χλωμή μπλε κουκκίδα.... " (Carl Sagan).

Το ομότιτλο βιβλίο του Pale Blue Dot: A Vision of the Human Future in Space (1994) (<u>http://en.wikipedia.org/wiki/Pale Blu...</u>) εμπνεύστηκε από την παραπάνω φωτογραφία.

Ο Carl Sagan Edward, Ph.D. (1934-1996) ήταν Αμερικανός αστρονόμος, αστροχημικός, συγγραφέας, και άκρως επιτυχημένος παρουσιαστής της αστρονομίας, της αστροφυσικής και των άλλων φυσικών επιστημών. Ήταν από τους πρωτοπόρος εξω-βιολογίας και προώθησε την αναζήτηση για Εξωγήινη Νοημοσύνη (SETI).

Έγινε παγκοσμίως γνωστός για το συγγραφικό επιστημονικό του έργο και για την από κοινού σύνταξη και την παρουσίαση της βραβευμένης τηλεοπτικής σειράς του '80 "Cosmos: A Personal Voyage", το οποίο έχει δει κατά περισσότερο από 600 εκατομμύρια άνθρωποι σε περισσότερες από 60 χώρες, καθιστώντας τη μία από της πιο δημοφιλής τηλεοπτικές σειρές ντοκυμαντέρ στην ιστορία. Η σειρά προβλήθηκε την δεκαετία του '80 και στη χώρα μας.

Το Voyager 1 εκτοξεύτηκε στις 5 Σεπτεμβρίου 1977. Ο Καρλ Σάγκαν, ως μέλος της ομάδας, πρότεινε το Voyager να τραβήξει μια φωτογραφία της Γης από την άκρη του ηλιακού συστήματος. Πράγματι, στις 14 Φεβρουαρίου 1990, αφού το Voyager 1 ολοκλήρωσε πρωταρχική αποστολή του, η NASA διέταξε το διαστημικό σκάφος να γυρίσει την κάμερα του προς τα πίσω, και να φωτογραφήσει τους πλανήτες του Ηλιακού μας Συστήματος από εκείνη τη μακρινή θέση.

(Uploaded on Jun 9, 2010, http://www.youtube.com/watch?feature=player\_embedded &v=K7L-d-mKxnU)

# Fracking for Geothermal Heat Instead of Gas

AltaRock has figured out how to use fracking to get more heat out of a geothermal well, but work remains before the energy source can dent carbon emissions.

Heat deep underground could provide a major source of carbon-free power, but it's too expensive to use.

The use of hydraulic fracturing has unlocked vast new reserves of natural gas. Now <u>Alta Rock</u>, a startup based in Seattle, is developing technology that might do the same for geothermal resources, turning a marginal power source into a major source of carbon-free electricity and heat in the United States.

Earlier this year near the Newberry Volcano in Oregon, Alta Rock demonstrated a key part of that technology, a process akin to fracking. Just as fracking involves pumping highpressure liquid into underground shale formations to unlock natural gas and oil that's been trapped there, the new technology could unlock heat trapped deep underground. Unlike solar and wind power, that heat would be available around the clock and in all sorts of weather.

Geothermal power plants now provide a tiny fraction of the world's energy needs—in the U.S., one of the world's biggest producers of geothermal energy, the total geothermal capacity is about 1 percent of the country's coal power capacity.

The main problem is that conventional geothermal plants rely on a rare combination of geological features. Hot rock has to be accompanied by large amounts of hot water or steam that can easily be pumped to the surface, where it would drive steam turbines to generate electricity. The rock formation needs to be porous enough that the water can be continuously recirculated and reheated to keep a power plant running. (Geothermal pumps are sometimes used to heat and cool homes, but these are inadequate for generating electricity because they work at much lower temperatures.)

Although such formations are rare, the amount of heat underground is actually huge (see "<u>Abundant Power from Uni-</u><u>versal Geothermal Energy</u>"). There's enough heat trapped under the United States within drilling distance (as deep as 10 kilometers) to supply its energy needs for thousands of years. AltaRock is one of several companies trying to figure out how to access more of that heat (see "<u>Cracking Rock to</u> <u>Get More from Geothermal Fields</u>" and "<u>Using CO2 to Ex-</u><u>tract Geothermal Energy</u>").

The basic idea is to modify the rock to allow water to flow through it (researchers call the resulting reservoirs enhanced geothermal systems, or EGS). This involves pumping cold water into rock in just the right way to trigger existing fractures in the rock to expand and allow water to flow through. It's been tried many times in the past—with efforts stretching back for decades. But it's been hard to get enough hot water flowing to justify the expense of drilling a well and building a power plant.

AltaRock's solution borrows a play from the natural gas industry. One of the key advances that allowed companies to produce economic amounts of natural gas from shale rock is the ability to fracture rock at several points along a single well, which reduces the number of wells that need to be drilled. They do this by temporarily plugging up part of a well so that they can apply hydraulic pressure to one section, and then move on to another part. It's long been known that doing the same thing could increase hot water production from a geothermal well. But it's not possible to use the same techniques used in fracking to plug the well. Geothermal wells are typically hotter, and they need to be engineered for higher amounts of water flow.

AltaRock has essentially invented a new plug. At a well near the Newberry Volcano, it has demonstrated that it's possible to temporarily plug a geothermal well with a special polymer. The material degrades after it's been down in the hot rock for a certain amount of time, allowing the company to move on to another part of the well. The company fractured three separate areas of one well using the technique. In a future commercial project, it might do seven or more per well, which "could dramatically lower the cost," says Susan Petty, the president and chief technology officer at AltaRock. She says the technology could be key to making EGS competitive with coal.

But while the AltaRock technology is a key advance, it's still early days for geothermal power. "AltaRock's technology is important, but it's only one part of the puzzle," says <u>Jeffer-</u> <u>son Tester</u>, professor of Sustainable Energy Systems at Cornell University. He says there are several remaining engineering challenges, and solving them will require sustained funding, not just for the project AltaRock is working on, but for several others as well. He says what's needed is a critical mass of demonstrations to prove to businesses that geothermal power plants are a sound investment. He estimates that it will take decades for geothermal to account for even 10 percent of the total power in the United States.

Petty says that the Newberry site could be producing power by as early as 2016, but much work remains. The next step for AltaRock is to drill another well nearby that will intersect with the porous rock it created with its fracturing technique. Engineers will pump water down the first well, which will circulate through the rock and heat up. Then it will be pumped out of the second well and used to produce steam at a power plant.

In past EGS projects, several problems have arisen at this stage. Sometimes the water flows too quickly from one well to the other, and so it doesn't get hot enough. At other times water disappears down unknown crevices in the rock, never to be seen again. To address these issues, AltaRock is developing new technologies for monitoring where water is flowing.

AltaRock is also working with GE on an improved process for using hot water to generate electricity. It involves improving heat transfer from the hot water to a working fluid that drives a turbine. The approach could increase power output from a geothermal site still more.

(Kevin Bullis / MIT Technology Review, October 21, 2013, http://www.technologyreview.com/news/520361/frackingfor-geothermal-heat-instead-of-gas)

# **(36 SO)**

# Κάποτε στη Γη έβρεχε... λεμονάδα

### Βροχή όξινη σαν τον χυμό του λεμονιού προκάλεσε τη μαζική εξαφάνιση των ειδών της Περμίου σύμφωνα με νέα θεωρία

Πριν από περίπου 252 εκατομμύρια χρόνια, στο τέλος της Περμίου περιόδου, ένα «Μεγάλο Θανατικό» όπως το αποκαλούν οι επιστήμονες ενέσκυψε στη Γη εξολοθρεύοντας το μεγαλύτερο μέρος των ειδών που ζούσαν τότε σε αυτήν. Διάφορες θεωρίες έχουν προταθεί για την αιτία που μπορεί να προκάλεσε αυτή τη μαζική εξαφάνιση των ειδών, τη μεγαλύτερη από όσες γνωρίζουμε να έχουν σημειωθεί στον πλανήτη μας Τώρα μια ομάδα ερευνητών υποστηρίζει ότι σημαντικό ρόλο έπαιξε το γεγονός ότι την περίοδο εκείνη ο ουρανός έβρεχε... λεμονάδα.

# Τα «Σκαλιἁ της Σιβηρίας»

Στη λεγόμενη – πιο επίσημα – Πέρμια-Τριασική εξαφάνιση υπολογίζεται ότι εξαλείφθηκε περισσότερο από το 90% των θαλάσσιων και το 70% των χερσαίων ειδών, «ανοίγοντας» τον δρόμο για την επικράτηση των δεινοσαύρων. Η αιτία της δεν έχει εξακριβωθεί ως τώρα. Μια από τις επικρατέστερες ερμηνείες όμως είναι ότι προκλήθηκε από μεγάλες ηφαιστειακές εκρήξεις.

Υπέρ αυτής της ἀποψης συνηγορεί το γεγονός ότι, ὁπως δείχνουν οι γεωλογικές χρονολογήσεις, στο «ὁριο» της Περμίου και της Τριασικής περιόδου, πριν από 250-251 εκατομμύρια χρόνια, σημειώθηκε ένα από τα μεγαλύτερα ηφαιστειακά «γεγονότα» των τελευταίων 500 εκατομμυρίων ετών στη γεωλογική ιστορία της Γης. Η ηφαιστειακή δραστηριότητα υπολογίζεται ότι διήρκεσε περίπου ένα εκατομμύριο χρόνια και οδήγησε στον σχηματισμό των «Σκαλιών της Σιβηρίας», μιας τεράστιας περιοχής ηφαιστειογενών πετρωμάτων που απλώνεται σε ἐκταση 2 εκατ. τ.χλμ. (περίπου όσο η Δυτική Ευρώπη) στον βορρά της Ρωσίας.



Τα «Σκαλιά της Σιβηρίας»

# Όξινη βροχή σαν το λεμόνι

Οι επιστήμονες από διάφορα αμερικανικά ερευνητικά κέντρα με επικεφαλής τον **Μπέντζαμιν Μπλακ** του Ινστιτούτου Τεχνολογίας της Μασαχουσέτης (MIT), χρησιμοποιώντας τρισδιάστατα υπολογιστικά μοντέλα που ανέπτυξαν, δημιούργησαν μια προσομοίωση των συνθηκών κατά το τέλος της Περμίου προκειμένου να διαπιστώσουν τις επιπτώσεις που θα είχε στην ατμόσφαιρα η έκλυση αερίων από τα «Σκαλιά της Σιβηρίας».



Βροχή όξινη όσο ο αδιάλυτος χυμός του λεμονιού και διάλυση του στρώματος του όζοντος στην ατμόσφαιρα συνέβαλαν στη μαζική εξαφάνιση των ειδών στο τέλος της Περμίου

Σύμφωνα με τα αποτελέσματα της μελέτης τους, η οποία δημοσιεύθηκε\_στην επιθεώρηση «Geology», η έκλυση τεράστιων ποσοτήτων διοξειδίου του άνθρακα και διοξειδίου του θείου θα πρέπει να είχε ως αποτέλεσμα τη δημιουργία εξαιρετικά όξινης βροχής. Η βροχή αυτή (η οποία είχε όπως υπολόγισαν pH ως και 2, όσο ο αδιάλυτος χυμός του λεμονιού) μόλυνε το έδαφος προκαλώντας τεράστιες βλάβες στα φυτά και στους ευάλωτους χερσαίους οργανισμούς. Επίσης οι ερευνητές είδαν ότι από την ηφαιστειακή δραστηριότητα θα πρέπει να εκλύονταν επίσης σε τεράστιες ποσότητες μεθυλοχλωρίδιο (ή φρέον 40) και άλλες αλογονωμένες ενώσεις προκαλώντας κατάρρευση του στρώματος του όζοντος της ατμόσφαιρας.

# Εφιαλτικό περιβάλλον

Οι επιστήμονες υπολογίζουν ότι οι ηφαιστειακές εκρήξεις δεν ήταν συνεχείς αλλά «επεισοδιακές», προκαλώντας κύματα όξινης βροχής και εξαφάνισης του όζοντος από την ατμόσφαιρα. Ωστόσο θεωρούν βέβαιο ότι οι τεράστιες διακυμάνσεις του pH της βροχής και της υπεριώδους ακτινοβολίας «στρεσάρισαν» σε τεράστιο βαθμό τη ζωή που υπήρχε τότε στη Γη συμβάλλοντας σημαντικά στην εξαφάνιση πολλών ειδών.

«Τα φυτά και τα ζώα δεν θα είχαν χρόνο να προσαρμοστούν σε αυτές τις μεταβολές στο pH της βροχής. Νομίζω ότι αυτό συνέβαλε οπωσδήποτε στο περιβαλλοντικό στρες που έκανε δύσκολη την επιβίωσή τους» δήλωσε ο δρ Μπλακ στην ιστοσελίδα του MIT «Και δεν ήταν μόνο αυτό το δυσάρεστο. Ένα σωρό πραγματικά άσχημες ατμοσφαιρικές και περιβαλλοντικές συνθήκες είχαν δημιουργηθεί ταυτόχρονα. Τα αποτελέσματα αυτά με έκαναν πραγματικά να λυπηθώ τους οργανισμούς του τέλους της Περμίου».

# Οι θεωρίες για το Μεγάλο Θανατικό

Οι επιστήμονες ονομάζουν την εξαφάνιση της Περμίου-Τριασικής περιόδου «Μεγάλο Θανατικό» γιατί είναι η μεγαλύτερη εξαφάνιση ειδών που γνωρίζουμε στην ιστορία της Γης. Σε μεγάλο βαθμό όλοι συμφωνούν ότι αυτή επήλθε σε τρεις φάσεις, εξ αιτίας του συνδυασμού της σταδιακής υποβάθμισης του περιβάλλοντος και ενός καταστροφικού γεγονότος.

Ως πιθανά «υποψήφια» καταστροφικά γεγονότα εκτός από τις ηφαιστειακές εκρήξεις που δημιούργησαν τα «Σκαλιά της Σιβηρίας» έχουν επίσης προταθεί η απελευθέρωση μεγάλων ποσοτήτων υδρίτη μεθανίου από τον βυθό της θάλασσας ή η πρόσκρουση ενός τεράστιου μετεωρίτη. Άλλες θεωρίες θέλουν υπεύθυνη την υποξία (έλλειψη οξυγόνου) των νερών των ωκεανών και την έκλυση υδρόθειου από τον βυθό τους, Καθώς κάτι τέτοιο αποτελεί συνέπεια της ανόδου των συγκεντρώσεων του διοξειδίου του άνθρακα στην ατμόσφαιρα, η ερμηνεία αυτή θεωρείται ότι «δένει» με εκείνη των ηφαιστειακών εκρήξεων στη Σιβηρία.

(Λαλίνα Φαφούτη / ΤΟ BHMA, 28.11.2013, http://www.tovima.gr/science/technologyplanet/article/?aid=543442)

# ΕΝΔΙΑΦΕΡΟΝΤΑ -ΛΟΙΠΑ

# New Approach to Explaining Evolution's Big Bang



Around 520 million years ago, many major groups of animals appear in the fossil record for the first time. Trilobites belonged to the same lineage as today's crustaceans and insects.

The name Myllokunmingia may not ring a bell, but it is worth knowing. This 520-million-year-old creature was the size of a guppy, with a tiny swordfish-like fin running high over its back. The fossils it has left behind preserve traces of a skull.

Humans have a skull, too. This and a number of other traits we share with Myllokunmingia reveal it to be one of the oldest, most primitive vertebrates yet found. It is, in other words, a hint of where we came from.

Myllokunmingia emerged during one of the most important phases in the history of life, an evolutionary boom known as the Cambrian explosion (named for the geological period when it took place). Over the course of about 20 million years, the oldest known fossils of most of the major groups of living animals appear, revealing a rapid diversification of life that led directly to humans.

"It's rapid in geological terms, but it's probably not rapid to anyone who's not a geologist," said Paul Smith, the director of the Oxford Museum of Natural History.

By some estimates, the first animals evolved about 750 million years ago. But it's not until around 520 million years ago that many major groups of living animals left behind their first fossils. For decades, scientists have searched for the trigger that set in motion this riot of diversity in the animal kingdom.

Recently, Dr. Smith and his colleague David Harper of the University of Durham took a look at the hypotheses that have been offered about what caused the Cambrian explosion. "It became apparent just how many hypotheses there were out there," Dr. Harper said. "Thirty-plus over the past 10 years."

The scientists found that many of those explanations had boiled the cause down to just one trigger. Geologists suggested geological causes. Ecologists proposed ecological ones. Many of those ideas have merit, Dr. Smith and Dr. Harper argue in a commentary in this week's Science, but it's a mistake to search for a single cause. They propose that a tangled web of factors and feedbacks were responsible for evolution's big bang. Long before the Cambrian explosion, Dr. Smith and Dr. Harper argue, one lineage of animals had already evolved the genetic capacity for spectacular diversity. Known as the bilaterians, they probably looked at first like little crawling worms. They shared the Precambrian oceans with other animals, like sponges and jellyfish. During the Cambrian explosion, relatively modest changes to their genes gave rise to a spectacular range of bodies.

But those genes evolved in bilaterians tens of millions of years before the Cambrian explosion put them to the test, notes Dr. Smith. "They had the capacity," he said, "but it hadn't been expressed yet."

It took a global flood to tap that capacity, Dr. Smith and Dr. Harper propose. They base their proposal on a <u>study pub-</u><u>lished last year</u> by Shanan Peters of the University of Wisconsin and Robert Gaines of Pomona College. They offered evidence that the Cambrian Explosion was preceded by a rise in sea level that submerged vast swaths of land, eroding the drowned rocks.

"There's a big kick that correlates with the sea level rise," Dr. Smith said of the fossil record. He and Dr. Harper propose that this kick happened thanks to the new habitats created by the sea level rise. These shallow coastal habitats were bathed in sunlight and nourished with eroding nutrients like phosphates. Animals colonized these new fertile habitats, Dr. Smith and Dr. Harper argue, and evolved to take up new ecological niches.

But these great floods also poisoned the ocean. The erosion of the coastlines released calcium, which can be toxic to cells. In order to survive, animals had to evolve ways to rid themselves of the poison. One solution may have been to pack the calcium into crystals, which eventually evolved into shells, bones, and other hard tissues. Dr. Smith doesn't think it's a coincidence that several different lineages of bilaterians evolved hard tissues during the Cambrian explosion, and not sooner.

These shells and other hard tissues sped up animal evolution even more. Predators could grow hard claws and jaws for killing prey, and their prey could evolve hard shells and spines to defend themselves. Animals became locked in an evolutionary arms race.

This new ecological food web grew even more complex. Bigger predators evolved that could eat smaller predators. Meanwhile, some bilaterians burrowed into the sea floor for the first time, allowing oxygen-rich seawater to flow into the sediment. Those first burrowers profoundly transformed the world's oceans, creating yet another habitat that other oxygen-breathing animals could also invade. "That drives the diversification onward," said Dr. Smith.

Kevin Peterson, a biologist at Dartmouth, praised Dr. Smith and Dr. Harper for pointing to the right way to study the Cambrian explosion. "We are long past identifying single triggers for the event," he said. Dr. Peters agreed that taking a holistic view of the Cambrian explosion would lead to a better understanding of it. "It'll be a fun next decade," he predicted.

But Philip Donoghue of the University of Bristol does not think the links Dr. Smith and Dr. Harper use in their hypothesis are tight enough yet. Questions still remain, for example, about how long vertebrates and other animals groups already existed before they left behind fossils like Myllokunmingia. If animals diversified earlier, then scientists will need to look at earlier causes.

"Timing," said Dr. Donoghue, "is everything."



(Carl Zimmer / Science / The New York Times, September 19, 2013)

#### **03 80**

# Νεκρή φύση Η λίμνη που μετατρέπει τα θύματά της σε στήλες άλατος



Όπως συνέβη στη γυναίκα του Λωτ όταν παρέβη τις εντολές και γύρισε να κοιτάξει την καταστροφή στα Σόδομα και τα Γόμορρα, τα πλάσματα που πέφτουν στη λίμνη Νάτρον της Τανζανίας γίνονται στήλες άλατος.

Η θανάσιμη λίμνη της βόρειας Τανζανίας είναι μια από τις θερμότερες και πιο αλκαλικές λίμνες του κόσμου -η θερμοκρασία του νερού μπορεί να ξεπεράσει τους 50 βαθμούς και το pH φτάνει το 10,5.

Η λίμνη παίρνει το όνομά της από το νάτρον, ένα ορυκτό που αποτελείται κυρίως από ανθρακικό νάτριο με μικρές ποσότητες διττανθρακικού νατρίου, δηλαδή μαγειρικής σόδας.

Μόνο ελάχιστα είδη ψαριών και κάποια θερμόφιλα, κατακόκκινα καρκινοειδή ζουν στα αφιλόξενα νερά της λίμνης. Μεγάλοι πληθυσμοί φλαμίνγκο τρέφονται με τα κόκκινα καρκινοειδή και απορροφούν τις χρωστικές στα φτερά τους, τα οποία σταδιακά γίνονται ροζ.



Τα νερά βάφονται κόκκινα από μικροσκοπικά καρκινοειδή, στα οποία οφείλεται το κόκκινο χρώμα στα φτερά των φλαμίγκο

Είναι όμως μια ριψοκίνδυνη ζωή, όπως μαρτυρά το φλαμίνγκο της παραπάνω εικόνας. Πουλιά και νυχτερίδες που απασβεστώθηκαν στα φονικά νερά απαθανατίστηκαν από τον φωτογράφο Νικ Μπραντ, γνωστό λάτρη της Αφρικής (είχε σκηνοθετήσει στην ανατολική Αφρική το βίντεο για το τραγούδι *Earth Song* του Μάικλ Τζάκσον το 1995).

Καλυμμένα με άλατα του ασβεστίου, τα μαρμαρωμένα πτηνά μοιάζουν με μακάβρια έργα νεκρής φύσης.

«Κανείς δεν γνωρίζει με βεβαιότητα πώς πεθαίνουν. Φαίνεται ότι μπερδεύονται από την ἀκρως ανακλαστική επιφάνεια της λίμνης και συντρίβονται πἀνω της, ὁπως τα πουλιἀ που πἑφτουν σε γυἀλινα παρἁθυρα» λἑει ο φωτογρἁφος στο περιοδικό New Scientist.

Το τελευταίο λεύκωμα του Νικ Μπραντ με φωτογραφίες ζώων της ανατολικής Αφρικής, με τίτλο Across the Ravaged Land, δημοσιεύεται από τον οίκο Abrams Books.

(Βαγγέλης Πρατικάκης / Newsroom ΔΟΛ, 1 Οκτωβρίου 2013, <u>http://news.in.gr/science-</u> <u>technology/article/?aid=1231267472</u>)

#### 68 80

# Ζουμ ανάμεσα στα μόρια Μικροσκόπιο διακρίνει για πρώτη φορά το δεσμό υδρογόνου



Αριστερά, δεσμοί υδρογόνου ανάμεσα σε μόρια υδροξυκινολίνης. Δεξιά, οι αντίστοιχες αναπαραστάσεις (Πηγή: J Zhang et al, Science)

Ο δεσμός υδρογόνου, ένα είδος έλξης που εμφανίζεται ανάμεσα σε ορισμένα μόρια, παίζει κρίσιμο ρόλο για τη χημεία της ζωής. Τώρα, ερευνητές στην Κίνα αναφέρουν ότι κατάφεραν για πρώτη φορά να τον δουν από κοντά -τα μοναδικά πορτρέτα παρουσιάζονται στο περιοδικό Science (http://www.sciencemag.org/content/early/2013/09/25/sci ence.1242603).

Ο δεσμός έχει υπερβολικά μικρό μήκος για να μπορεί να γίνει ορατός σε οποιοδήποτε οπτικό ή ηλεκτρονικό μικροσκόπιο. Ο άθλος βασίστηκε στο λεγόμενο μικροσκόπιο ατομικής δύναμης (AFM), το οποίο χρησιμοποιεί μια μικροσκοπική ακίδα για να σαρώσει το δείγμα και να συμπεράνει έτσι τις ιδιότητές του.

Στη συγκεκριμένη μελέτη, η ακίδα δεν άγγιζε τα μόρια αλλά ταλαντωνόταν δίπλα τους σε πολύ μικρή απόσταση. Η επιφάνεια του δείγματος άλλαζε τη συχνότητα ταλάντωσης, και η αλλαγή αυτή επέτρεψε την απεικόνιση του δείγματος σε ατομική ακρίβεια.

Η ίδια τεχνική είχε χρησιμοποιηθεί και για την πρώτη άμεση απεικόνιση του ομοιοπολικού δεσμού (http://www.sciencemag.org/content/337/6100/1326.short ) αλλά και την πρώτη απεικόνιση μορίων πριν και μετά μια

# χημική αντίδραση (<u>http://news.in.gr/science-</u> technology/article/?aid=1231251217).

Τα αποτελέσματα του πειράματος δείχνουν ξεκάθαρα ότι η μικροσκοπία ατομικής δύναμης μπορεί να βοηθήσει στη μελέτη των δεσμών υδρογόνου, οι οποίοι είναι μεν πανταχού παρόντες, η φύση τους όμως παραμένει αμφιλεγόμενη.

Ο ηλεκτροστατικός δεσμός παίζει κρίσιμο ρόλο στα πιο σημαντικά μόρια που γνωρίζει ο άνθρωπος: είναι η δύναμη χάρη στην οποία το νερό είναι υγρό σε θερμοκρασία δωματίου, αλλά και η δύναμη που συγκρατεί μεταξύ τους τις δύο έλικες στο μόριο του DNA.



Δεσμοί υδρογόνου ανάμεσα στα άτομα υδρογόνου (γκρι) και τα άτομα οξυγόνου (κόκκινο) στα μόρια του νερού

Ο δεσμός αυτός είναι μια διαμοριακή έλξη ανάμεσα σε μόρια που περιέχουν υδρογόνο και εμφανίζουν έντονα ασύμμετρη κατανομή των φορτίων τους. Για παράδειγμα, στο μόριο του νερού τα ηλεκτρόνια έλκονται περισσότερο από τα άτομα οξυγόνου από ό,τι από τα άτομα υδρογόνου, οπότε η μια πλευρά του μορίου έχει μερικό θετικό φορτίο και η άλλη πλευρά αρνητικό. Η «θετική» πλευρά ενός μορίου νερού έλκει την «αρνητική» πλευρά ενός δεύτερου μορίου, οπότε ανάμεσά τους σχηματίζεται ένας δεσμός υδρογόνου.

Για να διευκολύνουν το έργο τους οι ερευνητές στο Εθνικό Κέντρο Νανοεπιστήμης και Τεχνολογίας δεν χρησιμοποίησαν μόρια νερού αλλά την ουσία 8-υδροξυκινολίνη, της οποίας το μόριο έχει το πλεονέκτημα ότι είναι επίπεδο, με τον δεσμό υδρογόνου να προεξέχει και να ξεχωρίζει πιο εύκολα.

Η μελέτη περισσότερων μορίων με δεσμούς υδρογόνου θα μπορούσε στο μέλλον να δώσει οριστικές απαντήσεις για αυτή τη σημαντική διαμοριακής έλξης. «Η φύση του δεσμού υδρογόνου παραμένει αντικείμενο συζήτησης» επισημαίνει ο Δρ Κι, επικεφαλής της μελέτης.

Συγκεκριμένα, η μικροσκοπία AFM θα μπορούσε να απαντήσει στο ερώτημα του εάν ο δεσμός υδρογόνου είναι μια ηλεκτροστατική αλληλεπίδραση, όπως θεωρούνταν για πολύ καιρό, ή αν έχει χαρακτηριστικά ενός πραγματικού χημικού δεσμού, όπως υποδηλώνουν πειράματα περίθλασης ακτίνων Χ.

(Βαγγέλης Πρατικάκης / Newsroom ΔΟΛ, 1 Οκτωβρίου 2013, <u>http://news.in.gr/science-</u> <u>technology/article/?aid=1231267435</u>)

# **(36 80)**

# Η Γη «ἑκλεψε» τη Σελήνη από την Αφροδίτη

Το φεγγάρι δεν δημιουργήθηκε μετά από την πρόσκρουση στη Γη ενός μεγάλου ουρανίου σώματος σαν τον Άρη πριν από 4,5 δισεκατομμύρια χρόνια, αλλά ο πλανήτης με την έλξη της βαρύτητάς του «έκλεψε» τον δορυφόρο της Αφροδίτης.



Αυτή είναι η νέα «αιρετική» θεωρία ενός Αμερικανού επιστήμονα, για την προέλευση της Σελήνης ως αχώριστης συντρόφου της Γης. Η όλη ιδέα έρχεται σε αντίθεση με τη συντριπτική πλειονότητα των επιστημόνων, αλλά ο «πατέρας» της αντιτείνει ότι η έως σήμερα κυρίαρχη θεωρία έχει αρκετά κενά και αφήνει αναπάντητα διάφορα ερωτήματα.

Ο Ντέιβ Στίβενσον, καθηγητής πλανητικής επιστήμης του Ινστιτούτου Τεχνολογίας της Καλιφόρνιας (Caltech), παρουσiασε την εναλλακτική θεωρία σε συνέδριο που διοργάνωσε στο Λονδίνο η Βασιλική Εταιρία Επιστημών της Βρετανίας, με θέμα «Η προέλευση της Σελήνης», σύμφωνα με το Space.com.

Ο Αμερικανός επιστήμονας πιστεύει ότι η Αφροδίτη είχε σε τροχιά γύρω της έναν ήδη σχηματισμένο δορυφόρο, ο οποίος κάποια στιγμή «παγιδεύτηκε» στη βαρυτική έλξη της Γης και έτσι άλλαξε πλανητικό σύντροφο!

Όμως, το μεγάλο «όπλο» της κυρίαρχης θεωρίας της γιγάντιας πρόσκρουσης είναι ότι, όπως έχουν δείξει και πρόσφατες γεωχημικές αναλύσεις, η σύνθεση των πετρωμάτων της Γης και της Σελήνης έχουν μεγάλες ομοιότητες. Αυτή η διαπίστωση, όπως είπε ο Άλεξ Χολιντέι του πανεπιστημίου της Οξφόρδης, καθιστά μάλλον απίθανη την ιδέα «κλοπής» του φεγγαριού από την Αφροδίτη.

Όμως ο Ντέιβ Στίβενσον θεωρεί παράξενο το γεγονός πώς η Αφροδίτη δεν έχει γύρω της κανένα δορυφόρο και επιμένει πως αυτός ο καυτός πλανήτης πρέπει να μελετηθεί περισσότερο γεωχημικά, μήπως βρεθούν μεγάλες ομοιότητες με τη Σελήνη και τη Γη. Από την άλλη, όπως παραδέχεται, ανακύπτει το ερώτημα πώς απέκτησε η Αφροδίτη τον δικό της δορυφόρο, χωρίς να αποκλείει ότι αυτό συνέβη μετά από μια γιγάντια πρόσκρουση πάνω σε αυτήν και όχι πάνω στη Γη.

Εκτός από την κυρίαρχη θεωρία γέννησης της Σελήνης από τμήματα της Γης και του σώματος που έπεσε πάνω της (τα οποία εκτινάχθηκαν στο διάστημα και σταδιακά συντέθηκαν σε δορυφόρο), υπάρχουν και άλλες δύο θεωρίες που δεν πιστεύουν στην πρόσκρουση.

Η μία πιστεύει ότι η Σελήνη αποκόπηκε από το «πλευρό» της Γης (όπως η Εύα από τον Αδάμ) λόγω της υπερβολικά μεγάλης φυγόκεντρης δύναμης περιστροφής του πρώιμου πλανήτη μας, όταν η μέρα, δηλαδή ο χρόνος πλήρους περιστροφής γύρω από τον εαυτό της, δεν διαρκούσε 24 αλλά μόλις πέντε ή έξι ώρες.

Η άλλη θεωρία υποστηρίζει ότι η Σελήνη δεν προήλθε καθόλου από τη Γη, απλώς τα δύο σώματα εξαρχής δημιουργήθηκαν την ίδια εποχή και στην ίδια περιοχή, γι' αυτό έχουν ομοιότητες στη σύστασή τους.

(Η ΚΑΘΗΜΕΡΙΝΗ, 2 Οκτωβρίου 2013, http://portal.kathimerini.gr/4dcgi/ w articles kathciv 1 0 2/10/2013 521241)

# **03 80**

Η Κόκκινη Λιμνοθάλασσα της Χιλής Η μυστήρια λίμνη με τα κατακόκκινα σαν αίμα νερά...



Στην πόλη Camina στη βόρεια Χιλή, 3.700 μέτρα πάνω από την επιφάνεια της θάλασσας βρίσκεται η μυστηριώδης Κόκκινη Λιμνοθάλασσα. Τα νερά της είναι τόσο κόκκινα που κάποιος νομίζει ότι τόνοι αίματος ή κόκκινου μελανιού χύθηκαν στη λίμνη για να δημιουργηθεί αυτό το αποτέλεσμα.





Οι επιστήμονες υποστηρίζουν, βέβαια, ότι οι λίμνες οφείλουν το παράξενο χρώμα τους στα διάφορα είδη άλγης και φυκιών που κατοικούν στον πυθμένα τους.



Κοντά στην Κόκκινη Λιμνοθάλασσα υπάρχουν άλλες δύο λίμνες με κίτρινα και πράσινα νερά, οι οποίες σύμφωνα με τους ντόπιους αρχίζουν να κοχλάζουν όταν τις πλησιάζουν κακοί άνθρωποι.





(05 Οκτωβρίου 2013, http://news.youropia.gr/post.php?id=60147)

**(33 K)** 

# Η ανθισμένη... έρημος! Ένα πραγματικά σπάνιο θέαμα!



Σίγουρα αυτή την εικόνα δε τη συναντάς συχνά! Μοβ λουλούδια σε μια τεράστια έκταση στη Γιούτα των ΗΠΑ! Μια αχανής έρημος μετατρέπεται ξαφνικά σε έναν εντυπωσιακό ανθισμένο κήπο!



Τα συγκεκριμένα άνθη ευδοκιμούν σε ξερά εδάφη και είναι ανθεκτικές στην ανυδρία! Ανήκουν στην οικογένεια Phacelia και δεν ανθίζουν κάθε χρόνο. Σπάνια όμως φτάνουν σε τέτοια έκταση καλύπτοντας κυριολεκτικά μια ολόκληρο έρημο!



Βέβαια, όσο όμορφα κι αν είναι αυτά τα λουλούδια, το όνομά τους και μόνο (Scorpion Weed) μαρτυρά ότι δεν είναι και τόσο αθώα, καθώς αν τα αγγίξετε θα βγάλετε εξανθήματα σαν να έχετε αγγίξει δηλητηριώδη κισσό.



Για περισσότερες πληροφορίες: <u>Το λουλουδένιο χαλί της</u> ερήμου.

(Εμμανουέλα Φασομυτάκη / 18 Ιανουαρίου 2012, <u>http://news.youropia.gr/post.php?id=56874</u> -Λεωνίδας Κάλφας / 05 Οκτωβρίου 2013, <u>http://news.youropia.gr/post.php?id=60076</u>)

**68 80** 

# Δοκιμές επί χάρτου Σπάνια μορφή του άνθρακα «είναι το ισχυρότερο υλικό του κόσμου»



Το καρβύνιο, δείχνουν οι υπολογισμοί, είναι δύο φορές πιο ανθεκτικό από το γραφένιο (Πηγή: Vasilii Artyukhov/Rice University)

Το «καρβύνιο», μια ακριβοθώρητη μορφή του άνθρακα που έχει παρατηρηθεί μόνο στο εργαστήριο, είναι ακόμα πιο ανθεκτικό από το διαμάντι ή το θαυματουργό γραφένιο, δείχνουν οι τελευταίοι θεωρητικοί υπολογισμοί.

Το καρβύνιο, ή γραμμικός ακετυλενικός άνθρακας, είναι μακριές αλυσίδες από άτομα άνθρακα που συνδέονται εναλλάξ με διπλούς και τριπλούς δεσμούς.

Δεδομένου ότι κάθε τέτοια αλυσίδα έχει πάχος ενός μόλις ατόμου, το καρβύνιο είναι ουσιαστικά ένα μονοδιάστατο υλικό -σε αντίθεση με το γραφένιο, το οποίο αποτελείται από δισδιάστατα φύλλα με πάχος ενός ατόμου.

Οι πρώτες αναφορές για την ύπαρξη του καρβυνίου ήρθαν τη δεκαετία του 1960, μέχρι σήμερα όμως κανένας ισχυρι-

σμός για τη δημιουργία του στο εργαστήριο δεν έχει επιβεβαιωθεί πέραν πάσης αμφιβολίας. Η περίεργη μορφή του άνθρακα, όμως, έχει ανιχνευτεί στο Διάστημα.

Σύμφωνα με τη νέα μελέτη που δημοσιεύεται στο ACS Nano, μια επιθεώρηση της Αμερικανικής Χημικής Εταιρείας, η αντοχή του καρβυνίου στον εφελκυσμό, δηλαδή η αντοχή του στο τέντωμα, είναι διπλάσια του γραφενίου και ξεπερνά «κάθε άλλο γνωστό υλικό».

Επιπλέον, το γραφένιο έχει εξαιρετικά μεγάλη ακαμψία εφελκυσμού, καθώς είναι δύο φορές πιο άκαμπτο από το γραφένιο και τους νανοσωλήνες άνθρακα και τρεις φορές πιο άκαμπτο από το διαμάντι όταν κανείς επιχειρεί να το τεντώσει.

Οι επιδόσεις αυτές είναι ακραίες -προηγούμενες μελέτες έχουν δείξει ότι για να σπάσει ένα φύλλο γραφενίου θα έπρεπε να ακουμπήσει πάνω του ένας ελέφαντας που ισορροπεί πάνω σε ένα μολύβι.

Την τελευταία μελέτη υπογράφουν ερευνητές του Πανεπιστημίου του Ράις, οι οποίοι εκτιμούν ότι το καρβύνιο μπορεί να μετατραπεί σε μαγνητικό υπεραγωγό -αρκεί να περιστρέψει κανείς το ένα άκρο του μορίου κατά 90 μοίρες.

Ακόμα, η ερευνητική ομάδα υπολογίζει ότι το καρβύνιο είναι σταθερό σε θερμοκρασία δωματίου και δεν σχηματίζει χημικούς δεσμούς με τα διπλανά άτομα καρβυνίου -αυτό όμως έρχεται σε αντίθεση με προηγούμενες εκτιμήσεις, σύμφωνα με τις οποίες τα μόρια καρβενίου είναι ασταθή και εκρήγνυνται όταν έρθουν σε επαφή μεταξύ τους.

Σε κάθε περίπτωση, οι νέες θεωρητικές εκτιμήσεις θα είναι δύσκολο να επιβεβαιωθούν, αφού κανείς δεν μπορεί να παράξει καρβύνιο σε επαρκείς ποσότητες για να είναι δυνατή η μελέτη του.

Η μελέτη πραγματοποιήθηκε με συγχρηματοδότηση της αμερικανικής πολεμικής αεροπορίας, ενώ οι υπολογισμοί πραγματοποιήθηκαν στον υπερυπολογιστή DaVinCI του Πανεπιστημίου Ράις.

(Βαγγέλης Πρατικάκης / Newsroom ΔΟΛ, 10 Οκτ. 2013, <u>http://news.in.gr/science-</u> <u>technology/article/?aid=1231268647</u>)

# **(36 80)**

# Κίνδυνος σε περίπτωση αποσυναρμολόγησης Ραδιενεργή συσκευή εκλάπη από εργοτάξιο στο Λιανοκλάδι

Συσκευή που χρησιμοποιείται για την ανάλυση εδάφους και περιέχει δύο ραδιενεργές πηγές εκλάπη από εργοτάξιο εταιρείας που ασχολείται με την κατασκευή του αυτοκινητόδρομου Ε65 στην περιοχή Λιανοκλάδι Λαμίας.

Η Ελληνική Επιτροπή Ατομικής Ενέργειας προειδοποιεί όσους έχουν τη συσκευή στην κατοχή τους να μην επιχειρήσουν να την ανοίξουν και να μην τη διαθέσουν για ανακύκλωση.

«Σοβαρός κίνδυνος έκθεσης ατόμων σε ακτινοβολία και ραδιορρύπανσης του περιβάλλοντος υφίσταται μόνο στην περίπτωση διάλυσης ή αποσυναρμολόγησης της συσκευής» αναφέρει η Επιτροπή.

Το μηχάνημα, το οποίο μετρά την πυκνότητα του εδάφους, περιέχει μία ραδιενεργό πηγή αμερικίου, ενεργότητας 40 milliCurie, και μία ραδιενεργό πηγή καισίου, ενεργότητας 10 mCi.



Η συσκευή (κάτω δεξιά) βρισκόταν μέσα σε κίτρινο βαλιτσάκι που φέρει το σήμα της ραδιενέργειας (Πηγή: ΕΕΑΕ)

Η συσκευή, κόστους 10 έως 12 χιλιάδων ευρώ, βρισκόταν μέσα σε κίτρινο βαλιτσάκι με το σήμα της ραδιενέργειας όταν εκλάπη από οικίσκο Isobox του εργοταξίου κάποια στιγμή ανάμεσα στις 4 και τις 10 Οκτωβρίου.

Όσοι γνωρίζουν κάτι για την υπόθεση καλούνται να επικοινωνήσουν με την Αστυνομία (τηλ. 22310 56860) ή την Ελληνική Επιτροπή Ατομικής Ενέργειας (τηλ. 2106506714, 2106506803, 2106506700).

Ακόμα 49 τέτοιες συσκευές λειτουργούν στην Ελλάδα με άδεια της Επιτροπής.

(Newsroom ΔΟΛ, 10 Οκτ. 2013, <u>http://news.in.gr/science-technology/article/?aid=1231268697</u>)

# **03 80**

# Το ψηλότερο υπαίθριο ασανσέρ του κόσμου

Το ασανσέρ Bailong φέρεται να είναι το μεγαλύτερο υπαίθριο ασανσέρ στον κόσμο. Βρίσκεται στην επαρχία Χουνάν στην Κίνα, ανεβάζει τους τουρίστες... 400 μέτρα σε μία από τις κορυφές των γραφικών βουνών.

Πρόκειται για ένα διώροφο ασανσέρ που μπορεί να φιλοξενήσει 50 άτομα. Υπάρχουν τρεις τέτοιοι ανελκυστήρες. Τα τοιχώματα του ανελκυστήρα, φυσικά, είναι κατασκευασμένα από γυαλί.

Οι εργασίες κατασκευής ξεκίνησαν το 1999 και τελείωσε το 2002 . Το κόστος του υπολογίζεται στα 18 εκατομμύρια δολάρια.



Το έργο της κατασκευής ανελκυστήρα στο δάσος που προστατεύονται από την UNESCO προκάλεσε μεγάλη αντίδραση από τους οικολόγους.

Το ασανσέρ έχει εισέλθει στο Guinness World Records Book ως το ψηλότερο υπαίθριο ασανσέρ του κόσμου.



**THFH:** <u>http://www.pentapostagma.gr/2013/10/to-pshlotero-ypaithrio-asanser-tou-kosmou.html#ixzz2iRNJmJk0</u>

**(3)** 80

# Great excavations & sunken penthouses

From wealthy suburbanites craving more space in their mansions to overcrowded cities, the only way forward is down.



Lower-level luxury is the latest must-have in prime New York and London townhouses. Even though building underground is about 50% more expensive than building above ground, the impossibility of extending up or sideways make it the only viable option. Lot coverage regulations in many countries stipulate that you can only build on certain parts and percentages of the lot, usually about 25 – 50%, but the basement area is generally not included in that percentage. So the depth and size of these sunken penthouses are limited only to the amount of money you are willing to spend, which will vary with soil conditions, ... AND the ability of your concrete to withstand groundwater pressure.

As one of the world's most crowded cities, Singapore has already built upward - with apartment buildings reaching as high as 70 stories -, reclaimed underused properties for housing and pushed out coastlines for more usable land. To accommodate its ever growing population, it is now considering a novel solution: building underground to create an extensive, interconnected city, with shopping malls, transportation hubs, public spaces, pedestrian links and even cycling lanes.



A rendering of underground science city, which would house as many as 4200 scientists and researchers

As groundwater pressure is high on the island nation, such projects will require smart concrete engineering and the use of PRAHs in concrete mixes, in order to provide durable and waterproof underground structures. Third generation crystalline admixtures, such as PENETRON ADMIX, have been used extensively for almost 2 decades in Singapore and provide total concrete protection to landmark projects such as Changi Airport Terminal 3, Vivo City, Gardens By the Bay, The Sail etc.

The American Concrete institute's recent report on Chemical Admixtures for Concrete suggests crystalline admixtures as the only true PRAH (permeability-reducing admixture for hydrostatic conditions).

(PENETRON INDUSTRY NEWSLETTER, October 2013)



# Olympic Forest Park Observation Tower, Beijing, China

The Olympic Forest Park Observation Tower is Beijing's latest addition to its incredible Olympic Park, which hosted the 2008 Summer Olympics. Standing at 243 meters tall it is the largest structure in China's capital.

The Tower, located in the former Olympic Park in the north of Beijing overlooks the city's North/South axis with views of the Forbidden City, Tiananmen Square, the Mao Tse-Tung mausoleum, Qianmen Gate, Drum Tower and Bell Tower.

The Olympic Forest Park covers a total area of about 18,900 square meters. The Observation Tower consists of five connected, taller and shorter towers with viewing platforms going up from 186m to 243m above ground.



Inspired by blades of grass the futuristic towers blend seamlessly into their surroundings of lush greenery and the modern architecture of the Olympic structures.

To protect the massive concrete foundation of this impressive new Beijing landmark the PENETRON System was applied to more than 30,000 square meters of concrete surface using the dry-shake application (basement slab) and coating application (retaining walls) to ensure concrete durability for many years to come.



(PENETRON INDUSTRY NEWSLETTER, October 2013)

Nigeria's Eko Atlantic project: a city on the sea

First published in Aggregates Business International, September - October 2013, as "The city on the Sea"  $\,$ 



Huge stones are placed at the Eko Atlantic project to construct the causeway

Imagine a megapolis rising, Atlantis-like, from the sea. An urban development similar in size to New York's Manhattan that boasts thriving business and residential districts to help transform not just a city but an entire country. It sounds like the stuff of science fiction.

But the Eko Atlantic project in Lagos, Nigeria, is real and has become one of the most dazzling and most discussed construction developments in the entire world.

One hundred years ago, the area of land on which the new city will be built was beach, but time and Mother Nature had erased all but a trace. The coastal erosion had become so serious that Victoria Island, a suburb of Lagos, was in danger of serious flooding, and it was feared that those who lived near the water's edge would be forced to leave their homes. Steps were taken to protect the shoreline, but then a grander plan emerged: to reverse the erosion, reclaim 10km<sup>2</sup> of land and build a clean and eco-friendly city that would help ease the burden on Lagos, the biggest city in Africa's fastest-growing economy, and offer employment and opportunity to its 17 million citizens.

Work began in 2006, dredging the first few thousand of what will eventually be approximately 140 million tonnes of sand, making it currently the biggest land reclamation site in the world.



# **(3 K)**

The project includes the precise placement of concrete blocks, which will protect the area from sea erosion

Soon the foundations for the first buildings will be sunk, and by 2015 the skyline will start to change. To ensure the Atlantic Ocean does not return for what it once stole, the developers have designed an 8km-long barrier to keep the sea at bay. This has become known as the Great Wall of Lagos and is being built on the same place as the water's edge 100 years ago.

Each day for the past two years, a fleet of more than 150 vehicles, have driven the 161km return journey between the jobsite and a granite quarry at Ibadan from dawn to dusk to deliver 700,000 tonnes of stone.

These are piled 15m high and topped with concrete accropodes, huge geometrical objects designed to resist waves on coastal structures.

The scale of the work is staggering. So much concrete is needed that the site has its own factory to produce it, and the project employs more than 1,200 staff directly linked to the construction of the project to operate and maintain the excavators, haulers and other machinery.

The biggest supplier of machines, with more than 40 on site and several more at the quarry digging and moving rocks, is Volvo. At Eko Atlantic, there are excavators digging trenches for drainage and sewage; haulers moving rocks and sand, and a motor grader to maintain the roads on the site.

The operators and other staff have to work in searing heat, with temperatures often topping 40°C. This can cause choking clouds of sand and dust, though a specially adapted A25 hauler fitted with a water tank helps dampen and cool the sand to prevent such build-ups. Then, in the rainy season, they have to work in lashing rain and torrential storms. It is tough work, but thanks to their efforts the shape of a new land has emerged where once there was water.

In April, the wall was almost 4,000m long, growing by 3m each day.

(World Highways Electronic Newsletter, 14 November 2013, http://www.worldhighways.com/sections/emergent/feature s/nigerias-eko-atlantic-project-a-city-on-the-

sea/?utm source=Adestra&utm medium=email&campaign
\_id=415&project name=E-

newslet-

ters&link url=http%3A%2F%2Fwww.worldhighways.com% 2Fsections%2Femergent%2Ffeatures%2Fnigerias-ekoatlantic-project-a-city-on-the-

sea%2F&workspace id=2&workspace name=World%20Hig hways&link label=Read%20more..&campaign name=Worl d%20Highways%2014th%20November%202013%20eNew sletter)

**CS 80** 

# Λύθηκε το μυστήριο του περιστρεφόμενου αιγυπτιακού αγάλματος Δεν ήταν η κατάρα των φαραώ



Επί μήνες, οι έφοροι ενός μουσείου στη Βρετανία προσπαθούσαν να λύσουν το μυστήριο ενός αρχαίου αιγυπτιακού αγάλματος που περιστρεφόταν από μόνο του μέσα σε μια σφραγισμένη γυάλινη προθήκη.

Το βίντεο του περιστρεφόμενου αγάλματος στο Μουσείο του Μάντσεστερ προσέλκυσε εκατομμύρια χρήστες στο YouTube και οι θεωρίες έδιναν και έπαιρναν. Άλλοι έκαναν λόγο για κατάρα ενός αρχαίου αιγυπτιακού θεού, άλλοι υποψιάζονταν ότι το πνεύμα του προηγούμενου ιδιοκτήτη του αγάλματος είχε μπει μέσα του και το έκανε να τρέμει. Ορισμένοι, πιο προσγειωμένοι, πρότειναν τη θεωρία ότι το αγαλματίδιο επηρεαζόταν από κάποιο μαγνητικό πεδίο.

Το μυστήριο έλυσε τελικά ένας βρετανός μηχανικός έλυσε τελικά το αίνιγμα, ο οποίος ανακάλυψε ότι το άγαλμα περιστρεφόταν λόγω των δονήσεων που προκαλούσαν η κυκλοφορία των οχημάτων στο δρόμο και τα βήματα των επισκεπτών του μουσείου.

«Το ἀγαλμα περιστρεφόταν λόγω των δονήσεων. Τοποθετήσαμε ἐνα επιταχυνσιόμετρο και διαπιστώσαμε ότι οι δονήσεις από τα οχήματα που κινούνταν στο δρόμο και τα βήματα των επισκεπτών του μουσείου ήταν η αιτία» είπε ο Στιβ Γκόσλινγκ στο πρακτορείο Ρόιτερς.

Πράγματι, στο βίντεο του YouTube το άγαλμα σταματά να περιστρέφεται τις νυχτερινές ώρες, όταν το μουσείο αδειάζει από επισκέπτες και η κίνηση στους γύρω δρόμους μειώνεται.

Το αγαλματίδιο, το οποίο ύψος 25 εκατοστά και εικονίζει έναν άνδρα με το όνομα Νεμπ-Σένου, ήταν προσφορά στον Όσιρι, τον θεό του κάτω κόσμου.

Το είχε δωρίσει στο μουσείο ένας ιδιώτης συλλέκτης πριν από περίπου 80 χρόνια.

(Newsroom ΔΟΛ, με πληροφορίες από ΑΠΕ/Reuters, 20 Noε. 2013, <u>http://news.in.gr/perierga/article/?aid=1231274764</u>)

**03 80** 

# Calatrava's Sharq Crossing in Doha, Qatar [video]

Three-bridge project will include underwater sections and public recreational areas, spanning a length of about 12 kilometers.





The government of Qatar has released details of Sharq Crossing, a massive infrastructure project designed by Spanish architect Santiago Calatrava. The work in Doha will include three bridges connected by underwater tunnels, spanning 12 km. When complete, the crossing will connect Hamad International Airport to the cultural district of Katara, as well as the central business district. The project will accommodate a people mover system as well as vehicular and pedestrian traffic.



About 8 km of the project is underwater. The three bridges range from 600 to 1,310 meters long.

"Architecture for public works humanizes the natural landscape and serves the community," said Calatrava. "The Sharq Crossing project for Doha is a great opportunity to develop an exceptional and grand piece of public work."



The most complex of the bridges, West Bay, will include a park accessible by both an elevated walkway and a cable-

way. Fluor Corporation will manage the program, with construction projected to begin in 2015.









The video below give an idea of the scope of this unusual project.

(BD+C Staff / Building Design + Construction, December 24, 2013, <u>http://www.bdcnetwork.com/first-look-</u>calatravas-sharq-crossing-doha-gatar-video)

03 80

# The Engineer's top ten technologies of 2013

Trying to assess a technology's potential impact is a difficult and risky game. The most astounding looking invention may find little takeup in the real world or encounter major operational inefficiencies, while something seemingly dull or conventional like an electronic component can gradually have a transformative effect on the world.

With that in mind, compiling The Engineer's top 10 technology stories of the year becomes as much about what developments have made us laugh, shake our heads in disbelief or that we've spent hours poring over, as what we think have been the most important inventions.

So the following are our favourite stories of the year, but what have been yours? Have we missed anything that you think will make a huge contribution to the way we live in years to come. What did you most enjoy reading?

2013 was a big year for *The Engineer* with the return of our regular printed magazine, our move into podcasting and the launch of our conference, and next year promises to be even more exciting with the first Engineer Design & Innovation Show, as well as couple of other ideas we have in the pipeline.

In the meantime, we'd like to wish all our readers a very merry Christmas and happy New Year.

# 1. Self-driving cars

Creating a truly autonomous vehicle probably won't come with a single major breakthrough; it's more of an evolutionary process. But even though we have yet to see a selfdriving car come onto the market, 2013 felt like a year in which the prospect of one has come tantalisingly close. Major car firms have been testing prototypes on European roads while various elements of autonomous technologies (sense-and-avoid, self-parking) have been filtering their way into road-worthy models. As long as appropriate legislation can be put in place quickly, it seems likely that we could very soon be living in a world where the cars drive us.

# 2. Mind-controlled arm



As with self-driving cars, technology that enables us to control machines is being developed incrementally. But this year saw a big breakthrough for its use in this country when a soldier became the first UK citizen to receive a robotic arm linked directly to his brain. This has the potential to make a huge contribution to the quality of life of prostheses wearers, though it also begins to start a slightly scary new debate on upgraded human cyborgs.

# 3. 3D-printed buildings

2013 saw the hype around 3D printing ramp up almost exponentially. Much of it was centred around the first known production of a 3D-printed gun (http://www.theengineer.co.uk/opinion/comment/a-shot-across-the-bows-for-3d-printing/1016229.article), but the reality was that the technology had existed to do this for



years – it just took someone in the US with enough of an interest in enabling lots of people to have firearms to build one. A much more interesting 3D printing story was a project to create buildings on the Moon from the dust on its surface.

# 4. Ultrahaptics



The world of consumer electronics can sometimes experience genuine revolutions. This year's big new trend of socalled smart watches turned out not to be one of them. A better design might still change this and the likes of Google Glass and other wearable electronics probably will make a big impact, but in 2013 we got much more excited by a new way of interacting with computers. Microsoft Kinect and Leap Motion have already brought us gesture-based interfaces but researchers at Bristol University have added a new dimension known as Ultrahaptics where users can 'feel' a screen without touching it by sending vibrations through the air to their hand.

# 5. Self-assembly

It's not only cars that are becoming autonomous. We're actually at the start of an age where some of the things we build – electronics, satellites even artificial materials – actually build themselves. This year saw an array of development in self-assembly from the nano to the macro scale, and even the creation of the idea of 4D-printing, where additive manufactured items change their structure over time.

# 6. Car-disabling radio waves

There was a fantastic reaction to our story on a new nonlethal weapon that uses radio waves to disable the electronic systems in car engines from up to 50m. There was plenty of scepticism that it would ever become commercially available but also quite a few entertaining suggestions of what it might be used for.



# 7. Hyperloop



Another story that created quite a lot of disbelief and excitement was the proposals by Paypal billionaire and Space X founder Elon Musk for a solar-powered vacuum tube train. Given that Musk has indicated he doesn't have time to push the project forward it looks unlikely to ever be built, but that hasn't prevented speculation and debate on the future of mass transport.

# 8. Formula E



Electric cars have some way to go before they become commonplace, but several big projects are hopefully helping to dispel some of the myths about them. One was Elon Musk's other project, Tesla Motors, which began selling its electric super car in the UK this year. The other is the electric racing series Formula E, which has unveiled its first car in advance of the competition's launch next year. It's an incredible piece of largely British engineering, although neither it nor Tesla can do anything about the big sticking point of electric cars – their big price tag.

# 9. Cyborgans

One of our previous top ten lists featured 3D-printed organs and the potential for growing biological medical implants is an exciting one. But another route may provide an even better alternative to the current transplant system combining the best of nature with added human engineering through devices that we've deemed cyborgans.

# 10. Inflatable solar chimney

Possibly the most outlandish idea we've encountered this year, this 1km-tall inflatable tower designed to generate electricity by channelling air heated by the sun through turbines is probably not going to solve all our energy needs. But it certainly deserves a prize for being one of the most creative solutions.

(Stephen Harris / the **Engineer**, 20 December 2013, <u>http://www.theengineer.co.uk/blog/the-engineers-top-ten-</u> technologies-of-2013/1017735.article?cmpid=tenews\_80504)



# ΝΟΜΙΚΑ – ΣΥΜΒΑΤΙΚΑ ΘΕΜΑΤΑ

# **UK Bribery Act "ineffective" for construction**

Despite the introduction of a tough new Bribery Act in the UK in 2010, corruption is still common in the country's construction industry, according to respondents to a survey by the Chartered Institute of Building (CIOB).

The results showed that 28% of the 701 construction professionals surveyed felt that corruption was common within the UK construction industry.

Respondents suggested that cultural practices and economic conditions were the main reasons for the prevalence of corruption, and that squeezed tender margins and reduced workloads have pressurised some professions into corrupt practices as a means to survive.

More than one in three (35%) of those surveyed said they had been offered a bribe or incentive on at least one occasion. And over a third (38%) reported coming across cartel activity in the UK construction industry on at least one occasion. Of those, 29% claimed to have witnessed it over the last 12 months.

Nearly half of the respondents were unaware whether their company had a whistle-blowing policy, and only 7% said that they had used it, reporting varying degrees of success.

In addition, more than half of the respondents (54%) were unable to estimate the annual cost of fraud or corruption to their organisation, this is despite 45% of the sample describing themselves of senior management or director level.

Nearly 10% also indicated annual losses totaling £1 million (€1.2 million) or more as a result of fraud and corruption. Of those surveyed, 42% worked in large companies with 500 employees or more.

Furthermore, cover pricing – the submission of artificially high tenders to favour competitors – was seen as not be corrupt by 20% of respondents.

Other practices such as billing for unperformed work, collusion and cartel activity linked to the construction industry were recognised as corrupt.

Of those surveyed, 43% suggest that all the stages of the construction process were susceptible to corruption, while 35% specified that the pre-qualification and tendering phase was the most at risk.

# "Little progress"

CIOB deputy chief executive, Michael Brown, said, "Our findings reveal that little progress has been made since our first piece of research into corruption in 2006. What we have found is that cultural practices and the consequences of the recession have placed a greater strain on companies to sometimes engage in adverse practices as a survival mechanism."

And co-ordinator of the UK Anti-Corruption Forum, Graham Hand, said the findings from the survey were unacceptbale.

"This valuable report shows that despite the introduction of a tough new Bribery Act in 2010, corruption is still common in the construction business in this country. "Law enforcement agencies need to work with professional and business organisations to educate companies about their responsibilities, and they must act against companies that break the law."

(Helen Wright / CONSTRUCTION EUROPE, 07 Oct 2013, http://www.khl.com/magazines/constructioneurope/detail/item88836/UK-Bribery-Act-ineffective-forconstruction)

# **(36 80)**

# Contractors warn clients about long tender lists

Contractors are urging clients to slash their tender lists to just three or four firms or miss out on quality bids.

The industry expects a glut of major bids in the next 12 months.

Contractors are reluctant to waste resources on high quality bids for a large number of jobs where excessive levels of competition mean the chances of winning the work are low.

The size of tender lists has crept up throughout the recession as clients have sought to drive down prices. It is now not uncommon to see eight firms on a tender list.

Major contractors have told NCE that they will be unable to cope with the volume of tenders over the next year unless shortlists are cut down.

If clients to fail to act by cutting the number of firms on tender lists, contractors say they will be faced with little choice but to reject tender invitations or submit hastily repared ones

They say this will reduce bid quality and threaten project certainty.

"When we sit down and look at what we are going to have to bid, it is a massive list, with loads of big projects," said a bid leader at one major UK civils contractor.

"And that's before you get to all the little ones. Contractors won't admit it publicly, but I can tell you, we can't cope."

"We need clients to cut their tender lists to three, or four maximum."

The problem is acute, with almost all of the UK's major infrastructure clients inviting bids for multi-billion pound frameworks at the same time as other clients will be bidding individual contracts.

The Civil Engineering Contractors Association (Ceca) said it would focus on the issue in the next year.

"It is of course true that this is a really pressing problem," said Ceca external affairs director Alasdair Reisner. "The problem of massive tender lists has been fairly prevalent during the recession. But we are moving with great rapidity from a period of famine to a period of feast and there is a big issue here as there is only so much bidding resource available.

"A lot of capacity has been lost over the last four to five years and quality estimators are not something that can be produced quickly."

"We want to see quick procurement based on factors that seek to identify the best solution that is not necessarily the cheapest and that is not going to be using an adversarial and bureaucratic procurement process with six to eight firms on a tender list."

(Mark Hansford, 26 September 2013)

# **(38 80)**

# Φάρσα – αποκάλυψη Ψεὑτικη μελἑτη ἑγινε δεκτή από δεκἁδες επιστημονικἑς εκδόσεις



Η δημοσίευση υποτίθεται ότι εξέταζε το εάν μια ουσία έχει αντικαρκινική δράση

Δεκάδες επιστημονικές επιθεωρήσεις που ακολουθούν το νέο μοντέλο της δωρεάν πρόσβασης δέχτηκαν να δημοσιεύσουν μια μελέτη την οποία φαντάστηκε ένας δημοσιογράφος προκειμένου να ξεσκεπάσει τα δεινά του συστήματος.

Η αποκαλυπτική φάρσα που έστησε ο Τζον Μποχάνον, επιστημονικός δημοσιογράφος στο Πανεπιστήμιο του Χάρβαρντ, ξεγέλασε τις 157 από τις 304 επιθεωρήσεις ανοιχτής πρόσβασης στις οποίες απευθύνθηκε.

«Οποιοσδήποτε επιμελητής με λυκειακές γνώσεις χημείας και την ικανότητα να καταλαβαίνει μια απλή γραφική παράσταση θα έπρεπε να είχε εντοπίσει τα προβλήματα αμέσως» ανέφερε ο Μποχάνον στο δικτυακό τόπο του περιοδικού Science.

Η δημοσίευση περιέγραφε ένα απλό πείραμα που εξέταζε το κατά πόσο τα καρκινικά κύτταρα αναπτύσσονται πιο αργά σε ολοένα αυξανόμενες συγκεντρώσεις μιας ουσίας. Η μελέτη έβριθε από εσκεμμένα λάθη και παρέπεμπε σε ανύπαρκτες μελέτες αφρικανικών πανεπιστημίων.

Η φάρσα έβαλε στο στόχαστρο ειδικά για τις επιθεωρήσεις ανοιχτής πρόσβασης που βασίζονται στο λεγόμενο «χρυσό» κανόνα, βάσει του οποίου οι συγγραφείς μιας δημοσίευσης καλούνται να καταβάλλουν ένα τέλος.

Συνολικά 255 ελαφρώς διαφορετικές εκδοχές της μελέτης εστάλησαν σε 304 επιθεωρήσεις. Οι 157 έκαναν δεκτό το άρθρο και οι 98 το απέρριψαν. Στο 60% του συνόλου των περιπτώσεων, η δημοσίευση έγινε δεκτή χωρίς έλεγχο από άλλους επιστήμονες (peer review), ενώ από τις επιθεωρήσεις που υποτίθεται ότι έλεγξαν τη μελέτη το 70% την έκανε τελικά δεκτή.

Mόνο το Public Library of Science (PLoS), μια έγκριτη συλλογή ηλεκτρονικών επιθεωρήσεων, επισήμανε τα δυνητικά ηθικά προβλήματα της δημοσίευσης και την απέρριψε άμεσα.

Η ψεὐτικη μελἑτη ἑγινε δεκτή από το 45% των επιθεωρήσεων που ανήκουν στο Directory of Open Access Journals (DOAJ), ἐνα ποσοστό που ο ιδρυτής του DOAJ Λαρς Μηγιορνχαουγκε δηλώνει ότι «δυσκολεύεται να πιστέψει».

Το συμπέρασμα, όμως, είναι προφανές: ο έλεγχος ποιότητας σε πολλές δημοσιεύσεις ανοιχτής πρόσβασης είναι τουλάχιστον ελλιπής.

(Επιμέλεια: Βαγγέλης Πρατικάκης / in.gr, 07 Οκτ. 2013, <u>http://news.in.gr/science-</u> <u>technology/article/?aid=1231268215</u>)

(από Μιχάλη Μπαρδάνη)

# ΝΕΕΣ ΕΚΔΟΣΕΙΣ ΣΤΙΣ ΓΕΩΤΕΧΝΙΚΕΣ ΕΠΙΣΤΗΜΕΣ



# Current and Future Practices for the Testing of Multi-Component Geosynthetic Clay Liners

Edited by von Maubeuge Kent, line J.

# ASTM STP1562

Fifteen peer-reviewed papers address a decade of significant changes in manufacturing technology, design utilization, and market acceptance of multi-component geosynthetic clay liner materials. They are characterized by specially-engineered surface coatings, film attachments, bentonite modifications, and other components that enhance performance in specific ways.

This new publication helps to better identify changing material characteristics and designs, commonalities among these changes, and testing and standardization needs to better support the engineering community in regards to geosynthetic clay liners.

(ASTM, 2013)



# Principles of Pavement Engineering, 2nd edition

# Nick Thom

The new edition of *Principles of Pavement Engineering* is a crucial guide for those involved in the science of pavement design. It pro-

vides an in-depth analysis of the principles underlying material behaviour, pavement design and maintenance, making it essential reading for pavement engineers and infrastructure experts who are faced with practical design issues for which transient standards are insufficient. The new edition explores different construction types and levels of cost efficiency around the world and concentrates on an understanding of the behaviour of pavement materials and of the real meaning of tests carried out on those materials. Covering soils, granular materials, hydraulically-bound materials (including concrete), and asphalt, *Principles of Pavement Engineering*, explains their various properties and the way in which they are affected by such matters as compaction, water content and binder content.

*Principles of Pavement Engineering* offers an up-to date expansion on the fundamental principles of pavement engineering, including new information on

- design against potholes
- · stress absorbing membrane interlayers
- updated information on asphalt recycling, surface treatments, pavement edge issues and parking areas and the difficult issue of maintenance, strengthening and rehabilitation design.

This second edition offers a broad and applicable coverage of the subject, making it a key reference for practising pavement engineers at all levels as well as students and graduates.

(ICE, November 2013)



Liquefaction Around Marine Structures

B Mutlu Sumer

Advanced Series on Ocean Engineering: Volume 39

(with CD-ROM)

This book, whose primary aim is to describe liquefaction processes and their implications for marine structures such as pipelines, sea outfalls, quay walls and caisson breakwaters, discusses the subject of soil liquefaction in the marine environment.

In addition, the physics of liquefaction (including examples illustrating the catastrophic consequences of soil liquefaction with regard to marine structures) are described, and the mathematical modelling of liquefaction is treated in detail. Also, carefully selected numerical examples support the discussion of assessing liquefaction potential, and benchmark cases such as buried gas pipelines and their floatation, caisson breakwaters, cover stones and their interaction with liquefied soil along with counter measures are investigated.

# Contents

- Introduction and Physics of Liquefaction
- Biot Equations and Their Solutions
- Residual Liquefaction
- Momentary Liquefaction
- Floatation of Buried Pipelines
- Sinking of Pipelines and Marine Objects
- Liquefaction Under Standing Waves
- Liquefaction at Gravity Structures
- Stability of Rock Berms in Liquefied Soil
- Impact of Seismic-Induced Liquefaction
- Counter Measures

**Readership:** Professionals and researchers in the area of coastal, ocean and marine civil engineering; graduate and post graduate students.

(World Scientific, May 2014)

· warm-mix and cold-mix asphalt



# Handbook of Tunnel Engineering

# Bernhard Maidl, Markus Thewes, Ulrich Maidl

Tunnelling is one of the most interesting but also most challenging tasks for engineers. The two-volume

handbook covers the latest state of the associated fields such as geomechanics, structural design, machine and construction process technology and construction management.

Tunnel engineering is one of the oldest, most interesting but also challenging engineering disciplines and demands not only theoretical knowledge but also practical experience in geology, geomechanics, structural design, concrete construction, machine technology, construction process technology and construction management. The two-volume "Handbuch des Tunnel- und Stollenbaus" has been the standard reference for German-speaking tunnellers in theory and practice for 30 years. The new English edition is based on a revised and adapted version of the third German edition and reflects the latest state of knowledge. The book is published in two volumes, with the first being devoted to more practical themes of construction and construction process in drill and blast and mechanised tunnelling. Microtunnelling and ventilation are also dealt with. All chapters include practical examples.

(Ernst & Sohn, October 2013)



# Recommendations on Excavations

# DEUTSCHE GESELLSCHAFT FÜR GEOTECHNIK E.V.

For the new 3rd edition, all the recommendations have been completely revised and brought into line

with the new generation of codes (EC 7 and DIN 1054), which will become valid soon. The book thus supersedes the 2nd edition from 2008.

With the issue of these recommendations, which have the character of a standard, the "Building Excavations" working group of the German Geotechnics Association (DGGT) aims to provide assistance with the design and structural calculation of excavation support works.

The introduction of the Eurocodes for building control purposes made necessary a revision of the previous edition of the recommendations to comply with the requirements of DIN EN 1997-1:2009 together with the national annex DIN 1997-1/NA:2010-12 and the supplementary regulations of DIN 1054:2010-12. All recommendations were thoroughly checked, revised where necessary and adapted to new knowledge. Chapter 10 "Building excavations in water" was substantially revised. Due to the progress of development of measurement instruments and the more stringent requirements, Chapter 14 "Instrumentation for the monitoring and supervision of building excavation support works" was formulated completely anew.

The recommendations of the working group "Building Excavations" should be of assistance,

- to simplify the design and structural calculation of excavation support works,

- to harmonise loading assumptions and calculation procedures,

- to ensure the structural stability of excavation support works and their individual elements and

- to improve the cost-effectiveness of excavation support works.

(Ernst & Sohn, November 2013)



# Recommendations on Piling (EA Pfähle)

# DEUTSCHE GESELLSCHAFT FÜR GEOTECHNIK E.V.

This handbook provides a complete overview of pile systems and their application and production. It shows

their analysis based on the new safety concept providing numerous examples for single piles, pile grids and groups. These recommendations are considered rules of engineering.

This handbook provides a complete and detailed overview of piling systems and their application. The design and construction of piled foundations is based on Eurocode 7 and DIN 1054 edition 2010 as well as the European construction codes DIN EN 1536 (Bored piles), DIN EN 12699 (Displacement piles) and DIN EN 14199 (Micropiles).

These recommendations also deal with

- categorisation of piling systems,

- actions on piles from structural loading, negative skin friction and side pressure,

- pile resistances from static and dynamic pile test loading as well as extensive tables with the pile load-bearing capacity of nearly all piling systems based on values from practical experience,

- pile groups,

- performance of static and dynamic test loading and integrity tests,

- load-bearing behaviour and verifications for piles under cyclical, dynamic and impact actions

- quality assurance for construction.

An appendix with numerous calculation examples completes the work.

As part of the approval procedure for offshore wind energy structures, the Federal Office for Shipping and Hydrography (BSH) demands verifications according to the new Chapter 13 ("Load-bearing behaviour and verifications for piles un-

der cyclical, dynamical and impact actions") of the EA Pfähle (the recommendations of the Piling working group -2nd edition), which deals with external pile resistance for the foundations of offshore wind energy structures and the types of verifications to be provided under cyclical actions. The publication of the EA-Pfähle recommendations by the Piling working group of the German Society for Geotechnics (DGGT), which works with the same members as the piling standards committee NA 00-05-07, is intended to provide assistance for engineers active in the design, calculation and construction of piled foundations. The recommendations can thus be considered as rules of the technology and as a supplement to the available codes and standards.

# POINTS:

- Recommendations with the character of a standard

- Collects together important values from experience for design

- Contains example calculations

- Also applies to the foundations of offshore wind energy structures

# **AUTHOR BIOGRAPHY:**

The "Piling" working group AK 2.1 of the German Society for Geotechnics (DGGT) consists of about 20 experts from science, industry, construction administration and client organisations and has the same members as the standards committee "Piling" of the NABau.

SERIES: Ernst & Sohn Series on Geotechnical Engineering

(Ernst & Sohn, November 2013)



# **Civil Engineering Formulas**

# Tyler G. Hicks

This handy book presents some 2,500 formulas and calculation guides for civil engineers to help them in the design office, in the field, and on a variety of construc-

tion jobs, anywhere in the world. These formulas and guides are also useful to design drafters, structural engineers, bridge engineers, foundation builders, field engineers, professional-engineer license examination candidates, concrete specialists, timber-structure builders, and students in a variety of civil engineering pursuits.

Το βιβλίο είναι ελεύθερα διαθέσιμο από την ιστοσελίδα:

https://www.dropbox.com/s/pym091rdajd3ix7/Civil%20Eng ineering%20Formulas%20Book.pdf

and the<br/>actions.regarding an important new breakthrough relevant to geo-<br/>technical engineering.by the<br/>technicsfirst Technical Breakthrough Abstract is now open to all<br/>registered ASCE Library users. Not registered? Registerprovidenow.



# Environmental Geotechnics, 2nd edition

# R. W. Sarsby

article called a Technical Breakthrough Abstract (TBA).

Technical breakthrough abstracts are short contributions

that present original, concise, and practical information

*Environmental Geotechnics* is a forward-thinking guide to aid engineers in applying geotechnical principles, processes and techniques in

a way that will not only reduce their environmental impact but aim to benefit the environment.

The major construction-environment interface is geotechnical in nature. For engineers to be able to foresee environmental problems and modify construction projects, or derive novel approaches, to prevent negative impacts from their works, they need a thorough knowledge of their subject and a constant awareness of the 'pollution-output' of any construction operation.

*Environment Geotechnics* draws on the author's extensive personal experience to provide a thorough coverage of the key components of environmental geotechnics, enabling engineers to identify and convert complex environmental problems into situations which can be accurately analysed. Revisions in this second edition include a new chapter on foundations and the key elements of design using Eurocode 7, and revised coverage of radioactive waste management and the requirements for safe disposal; construction waste management, including the use of waste as a construction material; geosynthetics and geomembranes.

With illustrative examples on a variety of geotechnical topics, investigation methods and common problems, *Environmental Geotechnics* demonstrates the applications of geotechnical principles to practical construction, uniquely coupling comprehensive coverage of all aspects of geotechnical engineering with in-depth explanation of ground engineering situations which involve major interaction with the environment.

*Environmental Geotechnics* is an essential guide for construction professionals wishing to understand the latest concerns and developments on the construction-environmental interface as well as a textbook for all those involved in the study of civil engineering, engineering geology and environmental geotechnics.

(ICE, July 2013)

# Announcing New Journal Content for Geotechnical Engineers

The ASCE Journal of Geotechnical and Geoenvironmental Engineering (JGGE) is publishing a new type of

ΤΑ ΝΕΑ ΤΗΣ ΕΕΕΕΓΜ – Αρ. 63 – ΑΠΡΙΛΙΟΣ 2014



# Effective Site Investigation (Site Investigation in Construction Series)

# Site Investigation Steering Group

*Effective Site Investigation* is the guide to accepted best practice for

designing and executing good-quality site investigation, without which unexpected ground conditions during construction can result in escalating costs and late completions for construction professionals and their clients.

This guide explains the benefits of a thorough site investigation for all proposed developments, planned and carried out in line with relevant standards by a multi-disciplinary team of ground engineering professionals experienced in the required fields. Failure to carry out a good site investigation can put project viability at risk, affecting construction cost, time to completion, durability and whole-life cost, health and safety of workers and the public, and the environment.

It is essential that consideration is given to the suitability of investigative processes employed to ensure that the most appropriate methods are used to obtain cost-effective site investigation data and value for money for the client.

*Effective Site Investigation* provides guidance for all ground practitioners involved in site investigation, including geotechnical engineers, engineering geologists, geoenvironmental engineers and scientists, archaeologists, as well as specialists in other disciplines involved in specific investigations, and their clients.

(ICE, April 2013)



# Rock Mechanics Based on an Anisotropic Jointed Rock Model (AJRM)

# Walter Wittke

This book focuses on the fundamentals of rock mechanics as a basis for the safe and economical design and construction of tunnels, dam foun-

dations and slopes in jointed and anisotropic rock. It is divided into four main parts:

- Fundamentals and models
- Analysis and design methods
- Exploration, testing and monitoring
- Applications and case histories.

The rock mechanical models presented account for the influence of discontinuities on the stress-strain behavior and the permeability of jointed rock masses.

This book is for:

• Civil-and Mining-Engineers

- Geologists
- Students in the related fields

# (Ernst & Sohn, November 2013)



# Geotechnical Engineering Unsaturated and Saturated Soils

#### Jean-Louis Briaud

Written by a leader on the subject, Introduction to Geotechnical Engineering is first introductory geo-

technical engineering textbook to cover both saturated and unsaturated soil mechanics. Destined to become the next leading text in the field, this book presents a new approach to teaching the subject, based on fundamentals of unsaturated soils, and extending the description of applications of soil mechanics to a wide variety of topics. This groundbreaking work features a number of topics typically left out of undergraduate geotechnical courses.

(Wiley, December 2013)



# Response of Piled Buildings to the Construction of Deep Excavations

# Korff, M.

Deep excavations in densely populated urban areas around the world pose specific challenges due to the increasingly complex conditions in

which they are undertaken. The construction of underground car parks, cellar storage areas and major infrastructure in deep excavations helps to preserve the quality of space above ground. Despite the considerable effort that goes into their design and construction, such projects often encounter problems, such as damage to existing structures, delays and cost overruns.

This book presents the results of an extensive research project conducted at the University of Cambridge, in cooperation with the Netherlands Centre of Underground Construction (COB) and Deltares, the Dutch Institute for water, subsurface and infrastructure issues. The study gained insight into mechanisms of soil-structure interaction for piled buildings adjacent to deep excavations and resulted in suggestions for designing and monitoring deep excavations in urban areas with soft soil conditions. Monitoring data of the construction of three deep excavations for the North–South metro line in Amsterdam, the Netherlands, have been used to validate the methods described.

This book aims to contribute to the reduction of failure costs in the building industry and in underground construction in particular.

(IOS Press, June 2013)





# Geotechnical Collapses (Understanding the Problems and Finding the Solution)

# J. Mecsi, editor

This book is a compilation of cases of physical damages, focusing on construction engineering and – es-

sentially – demonstrating geotechnical problems, damages and solutions.

Realising a technical-engineering creation is usually a complex process, a joint outcome of cooperating experts. This type of work is rather burdened with a certain amount of risks, therefore needs a thoughtful attention. Without this let the reason be either ignorance, shallowness, irresponsibility, disorganization, lack of necessary funding, or even plethoric power of persons or bodies of any types – the systems built can cause serious damage. In some cases an implementation can result in large amount of financial loss and/or can critically hurt life of human beings.

This book is a compilation of cases of physical damages, focusing on construction engineering and – essentially – demonstrating geotechnical problems, damages and solutions.

The aim has been to give a working knowledge of geotechnical engineering, thus the case selection is subjective. The initial base for the collection takes its origin from the content of the workshop organized in Budapest, September 2010 by ISSMGE TC302, the Forensic Geotechnical Engineering Committee with the title "Failures, Disputes, Causes and Solutions in Geotechnics".

Majority of the selection is coming from this workshop, mainly summarizing experiences of Hungarian geotechnical engineers, but with adding some colour with more, invited papers having similar topic.

(ISSMGE Magyar Nemzeti Bizottság, 2013)



Geotechnical engineering examples and solutions using the cavity expanding theory pressuremeters, piles, grouted soil anchors

J. Mecsi, editor

One of the basic tasks of specialists in the profession of geotechnical engineering is to specify soil strains, deformations and movements around a cavity during expansion.

The followings are all related to the above topic:

- interpreting pressuremeter test results in order to determine in situ soil characteristics,
- obtaining the load-settlement curve of deep foundations,

- examining soil strains and movements around deep foundations,
- determining the shaft resistance of different types of pile,
- determining the strains on pile shafts subjected to horizontal forces,
- obtaining the tension-elongation curves of injected soil anchors, calculating the optimal design of anchors, etc.

The objective of the present book is to seek answers to the above questions through theoretical analyses based on practical observations collected from more than 40 years of experience in practical engineering and research work.

(ISSMGE Magyar Nemzeti Bizottság, 2013)



# ΗΛΕΚΤΡΟΝΙΚΑ ΠΕΡΙΟΔΙΚΑ

# International Society for Soil Mechanics and Geotechnical Engineering



# http://www.issmge.org/attachments/article/622/IS SMGE Bulletin Vol7 No5a Sept 2013(Part1).pdf http://www.issmge.org/attachments/article/622/IS SMGE Bulletin Vol7 No5b Sept 2013(Part2).pdf

Κυκλοφόρησε το Τεύχος 5 του 7<sup>ου</sup> Τόμου του ISSMGE Bulletin (Σεπτεμβρίου 2013) με τα παρακάτω περιεχόμενα:

- Address of Pedro Sêco e Pinto
- President 1400 day Report
- History of ISSMGE
- Present of ISSMGE
- Future of ISSMGE
- Asian Region: Past
- Asian Region: Present
- Asian Region: Future
- African Region: Past
- African Region: Present
- African Region: Future
- European Region: Past
- European Region: Present
- European Region: Future
- Reflections on ISSMGE Past
- North American Region: Present
- South American Region: Present
- North American Region: Future
- Australasian Region: Past
- Australasian Region: Present
- SEAGS AIT Partnership
- ICE BOOKS
- Event Diary
- Corporate Associates
- Foundation Donors
- Case History Journal



# http://www.issmge.org/attachments/article/645/IS SMGE Bulletin Vol7 No6 Dec 2013 4b4.pdf

Κυκλοφόρησε το Τεύχος 6 του 7<sup>ου</sup> Τόμου του ISSMGE Bulletin (Δεκεμβρίου 2013) με τα παρακάτω περιεχόμενα:

- Frank President Message
- Report ICSMGE Paris
- Report on iYGEC
- Nash Medal
- Foundation Report
- DVD for the Special Issue
- Hungarian Society Books
- Transportation Journal

# **NEWS ON RECENT CONFERENCES**

- 5th KGS-JGS
- Geosynthetic Belogna
- Chinese Taipei
- Auckland
- ISAFE Singapore

# UPCOMING CONFERENCES

- Offshore Geotech ISFOG
- Poppi Course

# OTHERS

- Briaud Book
- Event Diary
- Corporate Associates
- Foundation Donors
- ISSMGE's International
- Journal of Geoengineering
- Case Histories

# TECHNICAL ARTICLE

Izu-Oshima Disaster

**(3 8)** 



#### No. 24 - December 2013 <u>http://www.isrm.net/adm/newsletter/ver\_html.php</u> <u>?id\_newsletter=91&ver=1</u>

Κυκλοφόρησε το Τεύχος 24 / Δεκέμβριος 2013 του Newsletter της International Society for Rock Mechanics. Περιεχόμενα:

- President's 2014 New Year Address
- ARMS8 2014 ISRM International Symposium, Sapporo, Japan, October 2014
- Eurock 2014, Vigo, Spain, May 2014
- Submission of abstracts to the 13th International ISRM Congress in May 2015, Montreal, Canada, is now open
- ISRM sponsored meetings
- 5th ISRM Online Lecture by Dr John Read
- Boulder in memory of John Franklin to be placed in the Rock Garden of the University of Waterloo
- Mexican Society for Geotechnical Engineering joined the ISRM
- COGAN Competency in Geotechnical Project
- Young Members Presidential Group activities
- Underground excavation on the mass media
- Dr Georges Takla passed away
- Journal of the ISRM National Group of India

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### www.geoengineer.org

Κυκλοφόρησαν τα Τεύχη #105, #106 και #107 του **Newsletter του Geoengineer.org** (Οκτώβριος, Νοέμβριος και Δεκέμβριος 2013 αντίστοιχα) με πολλές χρήσιμες πληροφορίες για όλα τα θέματα της γεωμηχανικής. Υπενθυμίζεται ότι το Newsletter εκδίδεται από τον συνάδελ-φο και μέλος της ΕΕΕΕΓΜ Δημήτρη Ζέκκο (secretariat@geoengineer.org).

# **03 80**



### INTERNATIONAL TUNNELLING AND UNDERGROUND SPACE ASSOCIATION ita@news n°51 <u>www.ita-aites.org</u>

Κυκλοφόρησε το Τεύχος Νο. 51 – Οκτώβριος 2013 των ita@news της International Tunnelling Association με τα παρακάτω περιεχόμενα:

- Message from SOren Degn Eskesen, ITA President
- Latest ita@news
- Visit to Mexico
- ExCO meeting in Panama
- Registration for WTC 2014 is open
- ITA COSUF activities
- ITAtech in Tunnelling Journal
- Video of Muir Wood Lecture available
- An International Award for the video "Engineering careers in Tunnelling and Underground Space"
- Martin Knights New Fellow at Royal Academy
- Channel Tunnel wins Global Engineering "Century Award" as the most significant "Major Building Project in the last 100 Years"
- Master Builders Solutions® introduced to Underground Construction industry globally
- IRF World Meeting & Exhibition
- TAC Rock Tunnelling Workshop, Sheraton Wall Centre Hotel, Vancouver,15th -16th November 2013
- CTES Chile congress
- STUVA Conference, Stuttgart, 27th 29th November 2013
- ATC 2013 Arabian Tunnelling Conference

# ita@news n°52 www.ita-aites.org

Κυκλοφόρησε το Τεύχος Νο. 52 – Δεκέμβριος 2013 των ita@news της International Tunnelling Association με τα παρακάτω περιεχόμενα:

- Message from Soren Degn Eskesen, ITA President
- WTC 2014 is in less than 150 days
- Photo Contest
- Official Launch of WTC 2015
- Visit to Myanmar

- Visit to Bhutan
- 10th Iranian Tunnelling Conference
- ITA at IRF World Meeting
- International Tunnelling Awards
- Lifetime achievement award
- Arabian Tunnelling Conference
- Zoomlion is a new ITA Prime Sponsor

# **(3)** 80



# http://www.itacet.org/Newsletter/17 2013/index.p hp

Κυκλοφόρησε το Τεύχος Νο. 17 (Δεκέμβριος 2013) του ITACET Foundation με τα παρακάτω περιεχόμενα:

- President's address
- Alumni
- Comoing soon
- Seminar in Zagreb
- Seminar in Sao Paulo
- Seminar in Singapore
- Season's greetings

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# http://origin.library.constantcontact.com/download/ get/file/1111082143825-90/2013-11-igs-news-Vol29+Issue3.pdf

Κυκλοφόρησε το Τεύχος 3, Volume 29 των **IGS News**. Μεταξύ των θεμάτων περιλαμβάνονται:

- President's Corner: 30 Years of the International Geosynthetics Society
- General Information for IGS Members
- Announcing the "International Geosynthetics Photo Contest 2014"
- 10th International Conference on Geosynthetics (10ICG) "Call for Papers" for the IGS Young Members Session
- IGS Awards: Call for Nominations 2010 2013
- News from the Technical Committees of IGS
- Conference Reports



- IGS workshop during the 18th International Conference on Soil Mechanics and Engineering
- International Symposium on Design and Practice of Geosynthetic-Reinforced Soil Structures (and Joint Sessions with 26th Italian National Conference on Geosynthetics)
- Fourteenth International Waste Management and Landfill Symposium – Sardinia 2013
- Announcements of Conferences of IGS
- 10th International Conference on Geosynthetics 10ICG Berlin, Germany, 21 – 25 September 2014
- Announcements of Conferences under the Auspices of IGS
- 7th International Congress on Environmental Geotechnics
- News from the IGS Chapters and the Membership
- GeoMontreal 2013
- 11th Saxon Construction Textiles Symposium "Bautex 2014 Building with geosynthetics"
- "GSI Fellowships for Students" Request for Proposals
- List of IGS Chapters
- Official Journals of the IGS
- Geosynthetics International
- Geotextiles & Geomembranes
- Corporate Membership
- Corporate Members of the IGS
- Corporate Profile Siplast
- Corporate Profile Geosynthetic Materials Association
- Corporate Profile Exeed Geotextile LLC
- Corporate Profile SOLMAX
- Corporate Profile EUROIZOL
- IGS News Publisher, Editor and Chapter Correspondents
- IGS Council
- IGS Officers
- IGS Membership Application
- Calendar of Events

Modeling hydraulic conductivity of a geotextile filter during suspended solids accumulation, C.A. Franks; A.H. Aydilek; A.P. Davis

Using copulas to characterise the dependency of GCL shear strengths, X.Z.  $\ensuremath{\mathsf{Wu}}$ 

Tensile and hydraulic properties of geosynthetics after mechanical damage and abrasion laboratory tests, A. Rosete; P. Mendonça Lopes; M. Pinho-Lopes; M.L. Lopes

### Volume: 20, Issue: 6

Best Geosynthetics International Paper for 2012, R.J. Bathurst; J.P. Giroud

Influence of subgrade strength on the performance of geocell-reinforced foundation systems, A. Biswas; A. Murali Krishna; S.K. Dash

Experimental study of sediment trapping by geotextile mattress installed with sloping curtain, L. Xie; W. Huang; Y. Yu

Influence of woven structure on coir rolled erosion-control products, V.K. Midha; S. Suresh Kumar

A formula to predict the effect of the variable discharge capacity of prefabricated vertical drains, P.J. Venda Oliveira

Effect of geosynthetic creep on reinforced pile-supported embankment systems, P. Ariyarathne; D.S. Liyanapathirana; C.J. Leo

Please find the download of the articles at: http://www.icevirtuallibrary.com/content/issue/gein/20/5 http://www.icevirtuallibrary.com/content/issue/gein/20/6 For the IGS members to have FREE access to the papers they MUST log in through the IGS website.

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# Geosynthetics International www.thomastelford.com/journals

Κυκλοφόρησαν τα τεύχη αρ. 5 και 6 του 20<sup>ου</sup> τόμου (Οκτωβρίου και Δεκεμβρίου 2013) του περιοδικού **Geosynthetics International** με τα ακόλουθα περιεχόμενα:

# Volume: 20, Issue: 5

Prediction of geosynthetic clay liner desiccation in low stress applications, R.K. Rowe; A. Verge

Reinforcement of railway ballasted track with geosynthetic bags for preventing derailment, T. Kachi; M. Kobayashi; M. Seki; J. Koseki



# Geotextiles & Geomembranes

www.geosyntheticssociety.org/journals.htm

Κυκλοφόρησαν τα τεύχη αρ. 40 και 41 (Οκτωβρίου και Δεκεμβρίου 2013) του περιοδικού **Geotextiles & Geomembranes** με τα ακόλουθα περιεχόμενα:

# Volume 40

Editorial Board/Aims & Scope

Permeation of two GCLs with an acidic metal-rich synthetic leachate, Francesco Mazzieri, Gemmina Di Emidio, Evelina Fratalocchi, Marta Di Sante, Erio Pasqualini



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Physical modelling of nonwoven/nonwoven GCL shrinkage under simulated field conditions, R. Kerry Rowe, M.T. Rayhani, W.A. Take, G. Siemens, R.W.I. Brachman

A data base, statistics and recommendations regarding 171 failed geosynthetic reinforced mechanically stabilized earth (MSE) walls, Robert M. Koerner, George R. Koerner

Evaluation of the effects of facing stiffness and toe resistance on the behavior of GRS walls, M. Ehrlich, S.H. Mirmoradi

Effect of underliner on geomembrane strains in heap leach applications, R. Kerry Rowe, R.W.I. Brachman, H. Irfan, M.E. Smith, R. Thiel

Analysis of soil-welded steel mesh reinforcement interface interaction by pull-out tests, S.H. Lajevardi, D. Dias, J. Racinais

Calculating local geomembrane indentation strains from measured radial and vertical displacements, R.W.I. Brachman, M.K. Eastman

Buried high-density polyethylene pipe deflections at elevated temperatures, R.P. Krushelnitzky, R.W.I. Brachman

# Volume 41

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Geotextiles and Geomembranes: Best papers in 2012, R. Kerry Rowe

Limit equilibrium analyses of geosynthetic-reinforced twotiered walls: Calibration from centrifuge tests, Suliman B.A. Mohamed, Kuo-Hsin Yang, Wen-Yi Hung

Comparison of the adhesion and shear tensile strength of needle-punched GCLs, Belén M. Bacas, Elena Blanco-Fernandez, Jorge Cañizal

Improved performance of soft clay foundations using stone columns and geocell-sand mattress, Sujit Kumar Dash, Mukul Chandra Bora

The performance of a sand column internally reinforced with horizontal reinforcement layers, Yung-Shan Hong, Cho-Sen Wu

A practical methodology for the determination of failure envelopes of fiber-reinforced cemented sands, Nilo Cesar Consoli, Bernardo Scapini Consoli, Lucas Festugato

Design and construction of geocell foundation to support the embankment on settled red mud, T.G. Sitharam, A. Hegde

Self healing capacity of geosynthetic clay liners and influencing factors, Kartika Sari, Jinchun Chai

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Indian Journal of Geosynthetics and Ground Improvement Volume 2, Issue 2, November 4, 2013

The Indian Chapter of the International Geosynthetics Society (IGS) has published the second issue of 2013 of its Indian Journal of Geosynthetics and Ground Improvement (IJGGI). Volume 2, Issue 2 contains a number of technical articles that highlight the engineering and research interests influencing the practice in India:

- "Studies on Effects of Pre-stressing the Reinforcement on the Behaviour of Reinforced Granular Beds Overlying Weak Soil" by R. Shivashankar and J. Jayamohan
- "Consolidation of Lightly OC Clays with PVDs as a Phase Change Process" by P. Ayub Khan, M. R. Madhav and E. Saibaba Reddy
- "Improvement of Characteristics of Sand Mixing with Natural Coir Fiber" by Joyanta Maity, Bikash Chandra Chattopadhyay and Siba Priyo Mukherjee

The Indian Journal of Geosynthetics and Ground Improvement (IJGGI) is distributed to all members of the <u>Indian</u> <u>Chapter of the IGS</u>. Additionally, some issues are shared with IGS members via <u>www.geosyntheticssociety.org</u>.





Journal of the ISRM National Group of India

The ISRM (India) Journal was launched in 2012. It is a half yearly technical journal of the Indian National Group of the ISRM, which is involved in dissemination of information on rock mechanics and its related activities in the field of foundation and abutments of dams, tunnel engineering, mining, underground works, rock slope stability, road works, etc.

The 4th issue of the journal, Vol.2, N. 2, July 2013 can be downloaded from

http://www.isrm.net/fotos/editor2/newsletter24/isrm\_india july\_2013.pdf

# ΕΚΤΕΛΕΣΤΙΚΗ ΕΠΙΤΡΟΠΗ ΕΕΕΕΓΜ (2012 – 2015)

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