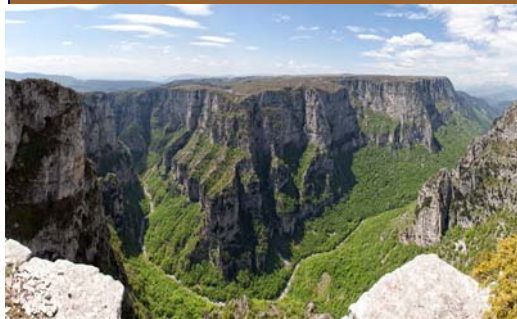


GRAND CANYON



ΦΑΡΑΓΓΙ ΤΟΥ ΒΙΚΟΥ
(από το περιοδικό ΕΛΛΗΝΙΚΟ ΠΑΝΟΡΑΜΑ)

Αρ. 33 – ΟΚΤΩΒΡΙΟΣ 2010



ΕΛΛΗΝΙΚΗ
ΕΠΙΣΤΗΜΟΝΙΚΗ
ΕΤΑΙΡΕΙΑ
ΕΔΑΦΟΜΗΧΑΝΙΚΗΣ
& ΓΕΩΤΕΧΝΙΚΗΣ
ΜΗΧΑΝΙΚΗΣ

Τα Νέα της Ε Ε Ε Ε Γ Μ

33

ΠΡΟΣΚΛΗΣΗ ΤΑΚΤΙΚΗΣ ΓΕΝΙΚΗΣ ΣΥΝΕΛΕΥΣΗΣ

Καλούνται τα μέλη της Ελληνικής Επιστημονικής Εταιρείας Εδαφομηχανικής και Γεωτεχνικής Μηχανικής να προσέλθουν στη Γενική Συνέλευση που θα γίνει την Δευτέρα 02.11.2010 και ώρα 7.00 μ.μ. στην Αίθουσα Εκδηλώσεων της Σχολής Πολιτικών Μηχανικών Ε.Μ.Π. στην Πολυτεχνειούπολη Ζωγράφου.

Σε περίπτωση που δεν επιτευχθή η απαιτούμενη απαρτία, η Γενική Συνέλευση θα γίνει την Τρίτη 23 Νοεμβρίου 2010 στον ίδιο χώρο και χρόνο, εφ' όσον υπάρξει απαρτία με συμμετοχή του $\frac{1}{4}$ των μελών που έχουν εκπληρώσει τις οικονομικές τους υποχρεώσεις (μέχρι και το 2010) προς την ΕΕΕΕΓΜ.

Σε περίπτωση που δεν επιτευχθή πάλι απαρτία, η Γενική Συνέλευση θα γίνει την **14^η Δεκεμβρίου 2010, ημέρα Τρίτη και ώρα 7.00 μ.μ.** στον ίδιο χώρο, οσαδήποτε οικονομικώς ως άνω ενήμερα μέλη και αν είναι παρόντα.

Τα θέματα της ημερήσιας διάταξης είναι :

1. Απολογισμός πεπραγμένων της Εκτελεστικής Επιτροπής από την τελευταία Γενική Συνέλευση της 13^{ης} Μαΐου 2008 μέχρι σήμερα.
2. Οικονομικός απολογισμός ετών 2008 και 2009.
3. Έκθεση Εξελεγκτικής Επιτροπής
4. Έγκριση απολογισμού πεπραγμένων και οικονομικών απολογισμών και απαλλαγή της Εκτελεστικής Επιτροπής από κάθε ευθύνη.

(συνέχεια στην σελίδα 2)

Π Ε Ρ Ι Ε Χ Ο Μ Ε Ν Α

6 ^ο Πανελλήνιο Συνέδριο Γεωτεχνικής και Γεωπεριβαλλοντικής Μηχανικής	3	- ISRM - Practical developments from mining industry focussed research	
Άρθρα	5	New Scaling Technology	28
- Μαρίνος Π., Ροντογιάννη Θ., Χρηστάρας Β., Τσιαμπάος Γ., Σαμπατακάκης Ν. «Ο σεισμός 7.1 της 4/9/2010 του Canterbury Νέας Ζηλανδίας. Σύντομη αναφορά και επί τόπου παρατηρήσεις»	5	Non Destructive Testing of Rockbolts	28
- Diary of an ASCE team studying New Zealand's earthquake damage	11	Ενδιαφέροντα Γεωτεχνικά Νέα	29
- David Reynolds "Canterbury's masonry churches battered"	11	- Landslide detector wins enterprise award	29
Μπαράζ φυσικών καταστροφών στην Ινδονησία. Magnitude 7.7 - Kepulauan Mentawai Region, Indonesia	13	- Rio Tinto systems to speed mine excavations	29
Προσκλήσεις για συμμετοχή σε ερευνητικά προγράμματα	15	- In Studying Haiti, a New Angle on an Earthquake's Intensity	30
- Development and implementation of technological innovation in underground construction in Europe	15	- Raise borer tries to free trapped Chilean miners	31
- TERRAFIRMA	15	Περιβαλλοντικά	33
- Μακροχρόνια συμπεριφορά θραυστών φίλτρων από ασβεστολιθικά υλικά στα φράγματα	16	- Rubber-technology innovator says it will keep eyes on road	33
Βραβεύσεις Γεωτεχνικών Επιστημόνων : Glory of India Award για τον Sarada Sarma	17	- Brazil Engineers a Critic-Proof Dam	33
Προσεχείς Γεωτεχνικές Εκδηλώσεις:	18	- Toronto hopes for big benefits from soil recycling	35
- INTERNATIONAL NO-DIG 2010 28 th International Conference & Exhibition	18	- St. Louis roads paved with smog-eating concrete	36
- All Russia Scientific and Technical Conference Devoted to 100 Anniversary of Prof. Boris I. Dalmatov	18	Νομικά Θέματα : Manslaughter reprieve for Cotswold Geotechnical boss	37
- Tunnelling in Difficult Ground Conditions - an International NATM Workshop	19	Ενδιαφέροντα	38
- 9th International Symposium of Structures, Geotechnics and Construction Materials	19	- Rock-Fiber Rebar Gets First Big Test	38
- 7th WBI-International Shortcourse Rock Mechanics, Stability and Design of Tunnels and Slopes	19	- Old concrete crushed, reused to extend life of Interstate 96 by up to 50 years	38
- 2nd International FLAC/DEM Symposium	20	- Active volcano drill project to reveal caldera secrets	39
- 6th International Conference on Dam Engineering	20	- Student opens door to earthquake shelter	41
- 14 th Australasian Tunnelling Conference 2011	21	- Simulation system produces realistic movies of earthquakes	41
- 13th International Conference of the International Association for Computer Methods and Advances in Geomechanics	22	- A specialist solution for motorways	41
- 2011 RETC Rapid Excavation & Tunneling Conference & Exhibit	23	- Γεωπάρκο Ψηλορείτη: Ένα μνημείο της φύσης!	42
- Slope Stability 2011, the International Symposium on Rock Slope Stability in Open Pit Mining and Civil Engineering	23	- Hotel to be moved for tunnel	43
- XI International Conference Underground Infrastructure of Urban Areas	24	- A concrete retort to the glass-and-steel cliché	43
- ITA-AITES WTC 2012 "Tunnelling and Underground Space for a global Society"	25	Νέες Εκδόσεις στις Γεωτεχνικές Επιστήμες : ΓΕΩΤΕΧΝΙΚΗ ΣΕΙΣΜΙΚΗ ΜΗΧΑΝΙΚΗ, Κυριαζής Δ. Πιπιλάκης	45
- 11th International Symposium on Landslides	25	Ηλεκτρονικά Περιοδικά	47
- 11th Australia-New Zealand Conference on Geomechanics	26		
- 34th International Geological Congress	26		
- 13th World Conference of the ACUUS Associated Research Centers for the Urban Underground Space Development - Opportunities and Challenges	26		
Νέα από τις Διεθνείς Γεωτεχνικές Ενώσεις	28		

(συνέχεια από την πρώτη σελίδα)

ΠΡΟΣΚΛΗΣΗ ΤΑΚΤΙΚΗΣ ΓΕΝΙΚΗΣ ΣΥΝΕΛΕΥΣΗΣ

5. Έγκριση παράτασης της θητείας της Εκτελεστικής Επιτροπής, που λήγει στις 13.05.2011, κατά ένα έτος, ήτοι μέχρι 13.05.2012, σύμφωνα με το άρθρον 8 του Καταστατικού, εν όψει της διοργάνωσης του XV Πανερωπαϊκού Συνεδρίου Εδαφομηχανικής και Γεωτεχνικής Μηχανικής, που θα διεξαχθή τον Σεπτέμβριο 2011 στην Αθήνα.
6. Διάφορες ανακοινώσεις.

Ο ΠΡΟΕΔΡΟΣ ΧΡΗΣΤΟΣ ΤΣΑΤΣΑΝΙΦΟΣ Δρ. Πολιτικός Μηχανικός	Ο ΓΕΝΙΚΟΣ ΓΡΑΜΜΑΤΕΑΣ ΜΙΧΑΛΗΣ ΚΑΒΒΑΔΑΣ Δρ. Πολιτικός Μηχανικός
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6^ο ΠΑΝΕΛΛΗΝΙΟ ΣΥΝΕΔΡΙΟ ΓΕΩΤΕΧΝΙΚΗΣ ΚΑΙ ΓΕΩΠΕΡΙΒΑΛΛΟΝΤΙΚΗΣ ΜΗΧΑΝΙΚΗΣ

29 Σεπτεμβρίου – 1 Οκτωβρίου 2010, Βόλος

http://portal.tee.gr/portal/page/portal/INTER_RELATIONS/INT_REL_P/SYNEDRIA_EKDHLWSEIS/2010/6thGeotechnic

Το 6^ο Πανελλήνιο Συνέδριο Γεωτεχνικής και Γεωπεριβαλλοντικής Μηχανικής διεξήχθη στον Βόλο από την Τετάρτη 29 Σεπτεμβρίου μέχρι την Παρασκευή 1 Οκτωβρίου 2010 με μεγάλη επιτυχία τόσο από πλευράς συμμετοχών, λαμβανομένης υπ' όψη της οικονομικής συγκυρίας (337 εγγραφέντες σύνεδροι και 47 μέλη οργανωτικής και επιστημονικής επιτροπής, προσκεκλημένοι, μέλη Διοικούσας Επιτροπής ΤΕΕ και Επιστημονικής Επιτροπής Πολιτικών Μηχανικών ΤΕΕ), όσο και από πλευράς επιστημονικού ενδιαφέροντος.

Στο Συνέδριο δόθηκε η ευκαιρία στους τεχνικούς επιστήμονες που δραστηριοποιούνται στον χώρο της Γεωτεχνικής και Γεωπεριβαλλοντικής Μηχανικής, ερευνητές, μελετητές, κατασκευαστές και στελέχη υπηρεσιών, να παρουσιάσουν αποτελέσματα ερευνητικών εργασιών, μεθόδους και τεχνολογίες που χρησιμοποιήθηκαν για την επίλυση γεωτεχνικών προβλημάτων, εμπειρίες που αποκτήθηκαν κατά τη μελέτη, εκτέλεση και επίβλεψη μικρών και μεγάλων τεχνικών έργων στη χώρα μας τα τελευταία πέντε χρόνια και γενικά να ανταλλάξουν απόψεις για θέματα που αποτελούν το ευρύ αντικείμενο της Γεωτεχνικής και Γεωπεριβαλλοντικής Μηχανικής.

Οι εργασίες του Συνεδρίου διεξήχθησαν στον Πολυχώρο του παλαιού κεραμοποιείου ΤΣΑΛΑΠΑΤΑ.



Κατά την Εναρκτήρια Συνεδρίαση τους συνέδρους προσφώνησαν ο Πρόεδρος του Περιφερειακού Τμήματος Μαγνησίας του ΤΕΕ συν. Σωκράτης Αναγνώστου, ο Αντιπρύτανης του Πανεπιστημίου Θεσσαλίας καθηγητής Μιχάλης Ζουμπουλάκης, ο Πρόεδρος της Οργανωτικής Επιτροπής του Συνεδρίου Δρ. Σπύρος Καβουνίδης, ο Πρόεδρος της ΕΕΕΕΓΜ Δρ. Χρήστος Τσατσάνιφος, ο οποίος απέδωσε φόρο τιμής στους εκκλιπόντες συναδέλφους γεωτεχνικούς μηχανικούς Άρι Στα-

ματόπουλο, Γιάννη Βαρδουλάκη, Σταύρο Χριστούλα, Γιώργο Παυλάκη, καθώς και στον Sergio Scianni, που σκοτώθηκε στο ατύχημα των Τεμπών, ενώ, τέλος, την κήρυξη των εργασιών του συνεδρίου έκανε ο συν. Ηρακλής Δρούλιας, μέλος της Διοικούσας Επιτροπής του ΤΕΕ.

Η Εναρκτήρια Συνεδρίαση συνεχίστηκε με την παρουσίαση της Προσκεκλημένης Διάλεξης από τον καθηγητή του Πανεπιστημίου Texas USA Θάνο Παπαγιαννάκη με θέμα «Οδοστρώματα: Από τον Εμπειρικό στον Θεωρητικό Τρόπο Σχεδιασμού».



Ακολούθησε η Συνεδρία για τα Γεωτεχνικά Θέματα Μαγνησίας, όπου ο συνάδελφος Αλέκος Αλεξάνδρου, Διευθυντής της Διεύθυνσης Τεχνικών Υπηρεσιών της Νομαρχιακής Αυτοδιοίκησης Μαγνησίας παρουσίασε την Ειδική Ομιλία «Γεωτεχνικά Προβλήματα Νομού Μαγνησίας» και η συνεδρία έκλεισε με την παρουσίαση των σχετικών με την Μαγνησία άρθρων.

Από το μεσημέρι της 29^{ης} Σεπτεμβρίου και μέχρι το τέλος του συνεδρίου οι εργασίες διεξήχθησαν σε παράλληλες συνεδρίες σε τρεις αίθουσες.

Συνεδρία 1 : Συμπεριφορά Γεωυλικών, Έρευνες Υπαίθρου και Εργαστηρίου, Προσομοιώματα. Στην έναρξη της συνεδρίας ο καθηγητής Μιχάλης Καββαδάς παρουσίασε Ειδική Ομιλία με τίτλο «Πόσο Ασφαλή είναι (ή θα πρέπει να είναι) τα Γεωτεχνικά Έργα».



Συνεδρία 2Α : Εδαφοδυναμική – Αλληλεπίδραση Εδάφους Κατασκευής. Στην έναρξη της συνεδρίας ο καθηγητής Γιώργος Γκαζέτας παρουσίασε Ειδική Ομιλία με τίτλο «Συνθήκες σεισμικής κατάρρευσης συστημάτων θεμελιώσεως-κατασκευής: ανάλυση και πείραμα».

Συνεδρία 2B : Εδαφοδυναμική – Επίδραση Τοπικών Συνθηκών. Στην έναρξη της συνεδρίας ο καθηγητής Κυριαζής Πιτιλάκης παρουσίασε Ειδική Ομιλία με τίτλο «Ισχυρή Εδαφική Κίνηση σε Πραγματικές Γεωμορφολογικές Συνθήκες».

Συνεδρία 3A : Πρανή – Κατολισθήσεις. Στην έναρξη της συνεδρίας ο Δρ. Σπύρος Καβουνίδης παρουσίασε Ειδική Ομιλία με τίτλο «Η 3η Διάσταση στην ευστάθεια πρανών».

Συνεδρία 3B : Πρανή – Κατολισθήσεις. Στην έναρξη της συνεδρίας ο καθηγητής Γιώργος Τσιαμπάος παρουσίασε Ειδική Ομιλία με τίτλο «Τέμνη: Παρουσίαση Πορίσματος Επιτροπής ΤΕΕ».

Συνεδρία 4 : Βραχομηχανική. Στην έναρξη της συνεδρίας ο καθηγητής Σταύρος Μπαντής παρουσίασε Ειδική Ομιλία με τίτλο «Πρόβλεψη της μηχανικής συμπεριφοράς της βραχομάζας στην πράξη: Δυνατότητες και περιορισμοί».



Ο καθηγητής Θεοδόσης Τάσιος και ο Πρόεδρος της ΕΕΕΕΓΜ Χρήστος Τσατσανίφους

Συνεδρία 5 : Πολιτιστική Κληρονομιά και Γεωτεχνική Μηχανική. Στην έναρξη της συνεδρίας ο καθηγητής Θεοδόσης Τάσιος παρουσίασε Ειδική Ομιλία με τίτλο «Τεχνικά έργα και άργιλος στη Αρχαία Ελλάδα» και στη συνέχεια η Δρ. Ε. Αλούπη Ειδική Ομιλία με τίτλο «Για την άργιλο στην αρχαιότητα». Μετά την ομιλία του ο καθηγητής Θεοδόσης Τάσιος τιμήθηκε από τον Πρόεδρο της Εκτελεστικής Επιτροπής της ΕΕΕΕΓΜ με τον τίτλο του Επίτιμου Μέλους για την μακρόχρονη και ευδόκιμη παρουσία του στον χώρο της Γεωτεχνικής Μηχανικής και για την συμβολή του στην προώθηση των σκοπών της ΕΕΕΕΓΜ.

Συνεδρία 6B : Σήραγγες. Στην έναρξη της συνεδρίας η Δρ. Θάλεια Τραβασάρου παρουσίασε Ειδική Ομιλία με τίτλο «Συμπεράσματα από τη Διερεύνηση Ανύψωσης Υποθαλάσσιας Σήραγγας λόγω Ρευστοποίησης του Περιβάλλοντος Εδάφους».

Συνεδρία 7 : Οπλισμένα Επιχώματα. Στην έναρξη της συνεδρίας ο κ. Γ. Κωνσταντινίδης παρουσίασε Ειδική Ομιλία με τίτλο «Παρουσίαση Οδηγίων Οπλισμένων Επιχωμάτων ΕΟ-ΑΕ» και στη συνέχεια ο καθηγητής Δημήτρης Ατματζίδης Ειδική Ομιλία με τίτλο «Χρήση Γεωαφρού EPS σε έργα οδοποιίας».

Συνεδρία 8 : Γεωπεριβαλλοντικά. Στην έναρξη της συνεδρίας η καθηγήτρια Μαρίνα Πανταζίδου παρουσίασε Ειδική Ομιλία με τίτλο «Περιβαλλοντική Γεωτεχνική: Προοπτικές Εφαρμογών στην Ελλάδα Σήμερα».

Συνεδρία 9B : Επιφανειακές και Βαθείες Θεμελιώσεις. Στην έναρξη της συνεδρίας η Δρ. Σ. Νικολάου παρουσίασε Ειδική Ομιλία με τίτλο «Ανασκόπηση Θεμελιώσεων Γεφυρών στην Ανατολική Ακτή των ΗΠΑ: Παρελθόν και Μέλλον».

Συνεδρία 10A : Βελτιώσεις Εδαφών. Στην έναρξη της συνεδρίας ο καθηγητής Γιώργος Μπουκοβάλας παρουσίασε Ειδική Ομιλία με τίτλο «Επιφανειακή θεμελίωση βάθρου γέφυρας σε ρευστοποιήσιμο έδαφος με ελεγχόμενη βελτίωση».

Συνεδρία 11 : Νοτιοανατολική Ευρώπη - Εφαρμογή Ευρωκωδίκων / Southeastern Europe – Application of the Eurocodes. Στην έναρξη της συνεδρίας ο ομότιμος καθηγητής Ανδρέας Αναγνωστόπουλος παρουσίασε Ειδική Ομιλία με τίτλο «Eurocode 7 – Geotechnical Design Ευρωκώδικας 7 - Γεωτεχνικός Σχεδιασμός».

Συνεδρία 12A : Φράγματα – Άοπλα Επιχώματα. Στην έναρξη της συνεδρίας ο Δρ. Γιώργος Ντουινιάς παρουσίασε Ειδική Ομιλία με τίτλο «Μακροχρόνια συμπεριφορά φραγμάτων».

Συνεδρία 13 : Διδάσκοντας Γεωτεχνική Μηχανική: Το Νέο Αίμα. Η καθηγήτρια Μαρίνα Πανταζίδου έκανε την εισαγωγική ομιλία και ακολούθησε συζήτηση στρογγυλής τραπέζης, με σύντομες εισηγήσεις από νέους διδάσκοντες Γεωτεχνικής Μηχανικής.

Συνεδρία Λήξης : Στην έναρξη της συνεδρίας παρουσίασαν Ειδικές Ομιλίες ο Δρ. Σπύρος Παπασπύρου με τίτλο «Εμπειρίες από την δεκαετία του 60» και ο κ. Ηλίας Σωτηρόπουλος με τίτλο «Γεωτεχνικές εμπειρίες και γεωτεχνικές περιπέτειες».

Στη συνέχεια ο κ. Μανώλης Βουζαράς, Ταμίας της ΕΕΕΕΓΜ από την ίδρυσή της!!! το 1966, τιμήθηκε από τον Πρόεδρο της Εκτελεστικής Επιτροπής της ΕΕΕΕΓΜ με τον τίτλο του Επίτιμου Μέλους για την μακρόχρονη και ευδόκιμη παρουσία του στον χώρο της Γεωτεχνικής Μηχανικής και για την συμβολή του στην προώθηση των σκοπών της ΕΕΕΕΓΜ.



Ο Ταμίας της ΕΕΕΕΓΜ Μανώλης Βουζαράς

Τέλος, Δρ. Χρήστος Τσατσανίφους παρουσίασε Ειδική Ομιλία με τίτλο «Θέματα Έρευνας – Μελέτης – Επίβλεψης», και έκανε το κλείσιμο των εργασιών του συνεδρίου.

Αίσθηση προκάλεσε το γεγονός της παντελούς απουσίας εκπροσώπων της πολιτείας από τις εργασίες του συνεδρίου, σε αντίθεση με τα προηγούμενα συνέδρια, στα οποία υπήρχε διαγκωνισμός για το ποιος θα παραστή και θα προσφωνήσει το συνέδριο!

Παράλληλα με το συνέδριο είχαμε και Τεχνική Έκθεση με εκθέτες εταιρείες γεωσυνθετικών προϊόντων και εταιρειών γεωτεχνικών μελετών.

Την όλη υποστήριξη της διεξαγωγής του συνεδρίου είχε το Τμήμα Διεθνών Σχέσεων του ΤΕΕ.

Ο ΣΕΙΣΜΟΣ 7.1 ΤΗΣ 4/9/2010 ΤΟΥ CANTERBURY ΝΕΑΣ ΖΗΛΑΝΔΙΑΣ ΣΥΝΤΟΜΗ ΑΝΑΦΟΡΑ ΚΑΙ ΕΠΙ ΤΟΠΟΥ ΠΑΡΑΤΗΡΗΣΕΙΣ

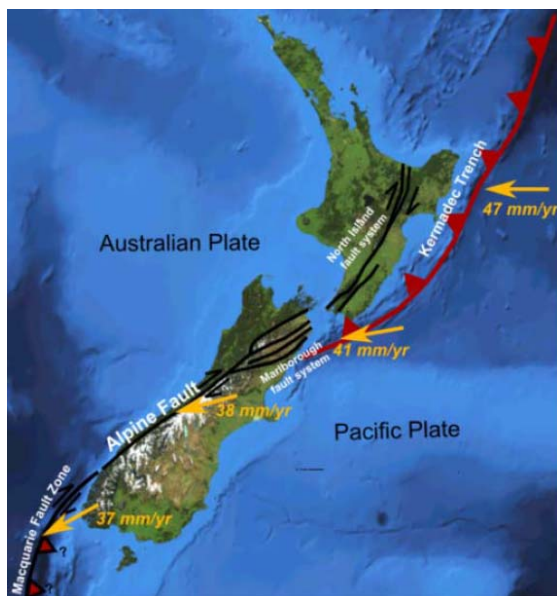
Μαρίνος¹ Π., Ροντογιάννη¹ Θ., Χρηστάρας² Β., Τσιαμπάος¹ Γ., Σαμπατακάκης³ Ν.

1. Εθνικό Μετσόβιο Πολυτεχνείο, 2. Αριστοτέλειο Πανεπιστήμιο Θεσσαλονίκης, 3. Πανεπιστήμιο Πατρών

Στις αρχές Σεπτεμβρίου, ενώ βρισκόμαστε στο Auckland, στο βόρειο νησί της Νέας Ζηλανδίας, για την παρακολούθηση του 11ου Συνεδρίου της IAGG με θέμα «Geologically Active», έγινε ο μεγέθους 7,1 σεισμός στην περιοχή του Canterbury, στο νότιο νησί, την οποία επισκεφθήκαμε τις επόμενες μέρες. Ακολουθώντας το θέμα του Συνεδρίου, η «ανήσυχη» φύση της Νέας Ζηλανδίας είχε σε αυτό την πιο εντυπωσιακή συμμετοχή. Το άρθρο αυτό περιλαμβάνει συνοπτικές πληροφορίες για το σεισμό, τη γεωδυναμική και τη γεωλογία της Νέας Ζηλανδίας, από τη βιβλιογραφία και πηγές του διαδικτύου καθώς και πληροφορίες για τις εδαφικές παραμορφώσεις και αστοχίες που προκάλεσε ο σεισμός, σύμφωνα με τις επί τόπου παρατηρήσεις μας.

ΕΙΣΑΓΩΓΗ

Η Νέα Ζηλανδία είναι μια νησιωτική χώρα που παρουσιάζει πολύ έντονη σεισμικότητα, λόγω της ιδιαίτερης θέσης που κατέχει από γεωδυναμική άποψη. Βρίσκεται πάνω στο όριο δύο τεκτονικών πλακών, της Αυστραλιανής και της Ειρηνικής το οποίο αναπτύσσεται με διεύθυνση ΒΑ-ΝΔ. Κατά μήκος του ορίου αυτού, που διέρχεται μερικές δεκάδες χιλιόμετρα ανατολικά από το βόρειο νησί ενώ διασχίζει το νότιο, συμβαίνουν πολύπλοκες τεκτονικές διεργασίες (Εικόνα 1).



Εικόνα 1. Η γεωδυναμική θέση του Βόρειου και Νότιου νησιού της Νέας Ζηλανδίας, στο όριο των τεκτονικών πλακών Αυστραλιανής και Ειρηνικής (από www.geology.umaine.edu)

Συγκεκριμένα, στο βόρειο νησί και στο βόρειο τμήμα του νότιου νησιού, που ανήκουν στην Αυστραλιανή πλάκα, ο ωκεάνιος φλοιός της Ειρηνικής πλάκας βυθίζεται κάτω από τον ηπειρωτικό φλοιό της Αυστραλιανής πλάκας με ταχύτητα που αναφέρεται ως 47 mm/year και αποτέλεσμα την εκδήλωση ηφαιστειακής δραστηριότητας. Αντίθετα, στο μεγαλύτερο τμήμα του νότιου νησιού, το οποίο ανήκει στην Ειρηνική

πλάκα, ο ηπειρωτικός φλοιός της Αυστραλιανής πλάκας συγκρούεται με τον ηπειρωτικό φλοιό της Ειρηνικής με ταχύτητα 37 mm/year και αποτέλεσμα την ορογένεση των νοτίων Άλπεων. Στο ενδιάμεσο τμήμα και στην οπισθοχώρα από τη ζώνη σύγκρουσης επικρατούν κινήσεις και ρήγματα οριζόντιας ολισθήσεως.

Οι ενεργές αυτές γεωτεκτονικές διεργασίες ξεκίνησαν με διάφορες μορφές και ρυθμούς πριν από 500 περίπου εκατομμύρια χρόνια και προκάλεσαν συνθήκες για δημιουργία αφενός πλουσίων φυσικών πόρων (μεταλλεύματα, λιγνίτες, πετρέλαιο, αέριο) και αφετέρου ενός πολύ όμορφου φυσικού περιβάλλοντος που όπως συμβαίνει κατά κανόνα στις γεωλογικά ενεργές περιοχές, συνδέεται με αυξημένη σεισμική και γενικότερα γεωλογική επικινδυνότητα.

Ο σεισμός της 4ης Σεπτεμβρίου 2010, συνέβη στις 4.35 π.μ. τοπική ώρα, είχε μέγεθος 7.1 και επίκεντρο στην πόλη Darfield, 45 km δυτικά από την πόλη Christchurch (Εικόνα 2), στο μέσον περίπου του νότιου νησιού (συντεταγμένες επίκεντρου 43.530° N, 172.120° A). Το εστιακό βάθος, σύμφωνα με την Γεωλογική Υπηρεσία της Νέας Ζηλανδίας, ήταν 10 km (5 km σύμφωνα με την Γεωλογική Υπηρεσία των Η.Π.Α.). Ο σεισμός δεν είχε ευτυχώς ανθρώπινα θύματα, αλλά προξένησε πολλές βλάβες σε κατοικίες και τεχνικά έργα και σημαντικές εδαφικές παραμορφώσεις και αστοχίες.



Εικόνα 2. Χάρτης με την θέση του επίκεντρου του σεισμού του Canterbury, δυτικά της πόλης Christchurch η οποία, μαζί με την πόλη του Καίαιοι, υπέστη τις μεγαλύτερες καταστροφές (από www.geonet.org.nz)

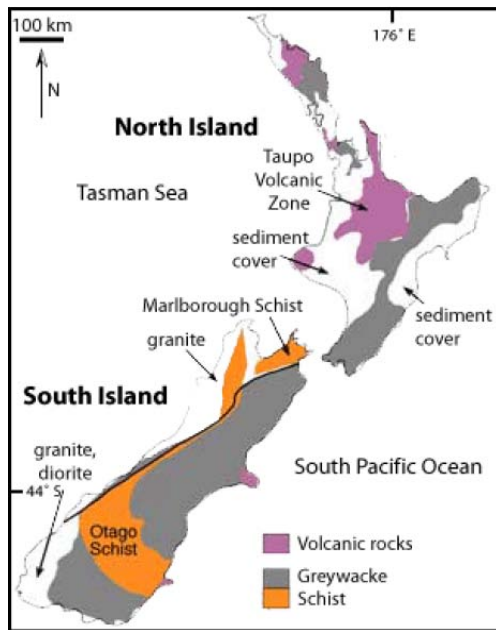
Η ΓΕΩΛΟΓΙΚΗ ΔΟΜΗ ΤΗΣ ΝΕΑΣ ΖΗΛΑΝΔΙΑΣ

Τα νησιά της Νέας Ζηλανδίας αποτελούσαν τμήμα μιας ευρύτερης ηπειρωτικής περιοχής που περιλάμβανε την Ανταρκτική και την Αυστραλία. Τα παλαιότερα πετρώματα που απαντούν στα νησιά είναι ηλικίας 510 εκ. ετών και δομούν τις δυτικές ακτές του νότιου νησιού. Στον απλοποιημένο γεωλογικό χάρτη της εικόνας 3 φαίνονται οι κύριες γεωλογικές ενότητες που είναι οι σχιστόλιθοι, οι γραουβάκες, τα εκρηξιγενή πετρώματα και το κάλυμμα των νεώτερων ιζημάτων.

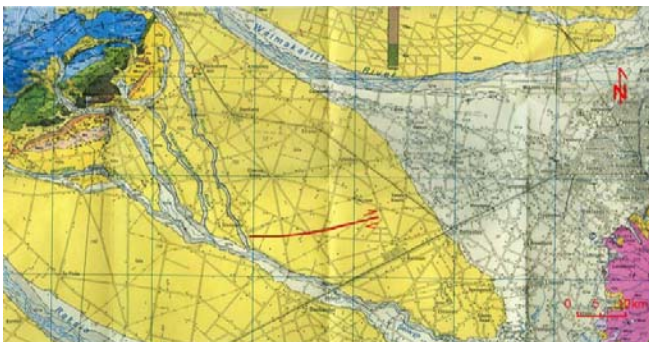
Η γεωλογική ιστορία της Νέας Ζηλανδίας διαμορφώθηκε από τρεις περιόδους ιζηματογένεσης και τρεις περιόδους ορογένεσης. Συνοπτικά, τα πετρώματα από 510 έως 83 εκ. χρόνια δημιουργήθηκαν κατά τη διαδικασία μιας ενεργούς σύγκλισης των τεκτονικών πλακών, στη συνέχεια από τα 83 έως τα 23 εκ. χρόνια υπήρξε περίοδος τεκτονικής ησυχίας, καταβύθισης και ιζηματογένεσης. Από τα 23 εκ. χρόνια οι τεκτονικές διαδικασίες ξανάρχισαν έντονες και συνεχίζονται μέχρι σήμερα, με ρυθμούς μετατόπισης της τάξεως των 4-5 εκατοστών ανά έτος (<http://sci.waikato.ac.nz>).

Ιδιαίτερα στην περιοχή του Canterbury εκτός από τους σχιστόλιθους και γραουβάκες του υποβάθρου απαντούν ασβεστόλιθοι ηλικίας 34-24 εκ. ετών, ηφαιστειακά πετρώματα ηλικίας 11-6 εκ. ετών και 2.5 εκ. ετών. Παγετώδεις και λιμναίες αποθέσεις καλύπτουν τμήμα της περιοχής, ενώ οι

πεδιάδες έχουν πληρωθεί με αλλουβιακές αποθέσεις προερχόμενες από τα μεγάλα ποτάμια που ξεκινούν από τις νότιες Άλπεις. Τμήμα του γεωλογικού χάρτη της περιοχής φαίνεται στην εικόνα 4.



Εικόνα 3. Απλοποιημένος γεωλογικός χάρτης της Νέας Ζηλανδίας. Με γκρι χρώμα οι σχιστόλιθοι, με κίτρινο οι γραουβάκες, με ιώδες τα ηφαιστειακά πετρώματα και με λευκό το κάλυμμα των ιζημάτων (από www.geology.um.maine.edu).



Εικόνα 4. Γεωλογικός χάρτης τμήματος της περιοχής του Canterbury, δυτικά του Christchurch. Με γαλάζιο και πράσινο χρώμα απεικονίζεται το υπόβαθρο, με ιώδες τα ηφαιστειακά πετρώματα και με κίτρινο το κάλυμμα των τεταρτογενών ιζημάτων. Με λευκό χρώμα οι πολύ πρόσφατες ποτάμιες αποθέσεις. (Σημειώνεται επίσης με κόκκινη γραμμή η σεισμική διάρρηξη, για την οποία στοιχεία δίνονται παρακάτω).

ΣΕΙΣΜΟΤΕΚΤΟΝΙΚΑ ΣΤΟΙΧΕΙΑ

Είναι γνωστό ότι η Νέα Ζηλανδία, έχοντας κινητήρια μηχανή της γεωδυναμικής της εξέλιξης το πλησίασμα δύο τεράστιων τεκτονικών πλακών, παρουσιάζει πολύ έντονη σεισμικότητα, γεγονός που έχει ως αποτέλεσμα να έχει αντίστοιχα και πολύ ανεπτυγμένη αντισεισμική έρευνα. Στον Πίνακα 1 δίνονται οι μεγαλύτεροι σεισμοί τα τελευταία 150 περίπου χρόνια, με το μέγεθος, την ένταση και το εστιακό τους βάθος, ενώ στην εικόνα 5 δίνεται η κατανομή των epicenters των επιφανειακών σεισμών την τελευταία δεκαετία.

Αν και η περιοχή του Canterbury ήταν γνωστή για τη σεισμική της επικινδυνότητα, αξίζει να αναφερθεί ότι το ρήγμα του σεισμού θεωρείται ως ένα «τυφλό» ρήγμα επειδή δεν είχε προηγουμένως χαρτογραφηθεί, αν και έχει χαρτογραφηθεί ένας αριθμός 500 περίπου ενεργών ρηγμάτων στη Νέα Ζηλανδία (Εικόνα 6).

Πίνακας 1. Κατάλογος των πιο καταστροφικών σεισμών της Νέας Ζηλανδίας (από New Zealand Listener, Sept. 2010)

Place	Year	Richter	MM	Depth
Marlborough	1848	7.8	10	20km
Wairarapa	1855	8.2	10	25km
Nth Canterbury	1888	7.1	9	15km
Murchison	1929	7.8	10	12km
Napier	1931	7.8	10	20km
Pahiatua	1934	7.6	9	12km
Wairarapa	1942	7.2	8	12km
Inangahua	1968	7.1	10	10km
Edgecumbe	1987	6.5	9	6km
Gisborne	2007	6.8	8	40km
Dusky Sound	2009	7.8	7	12km
Canterbury	2010	7.1	9	10km



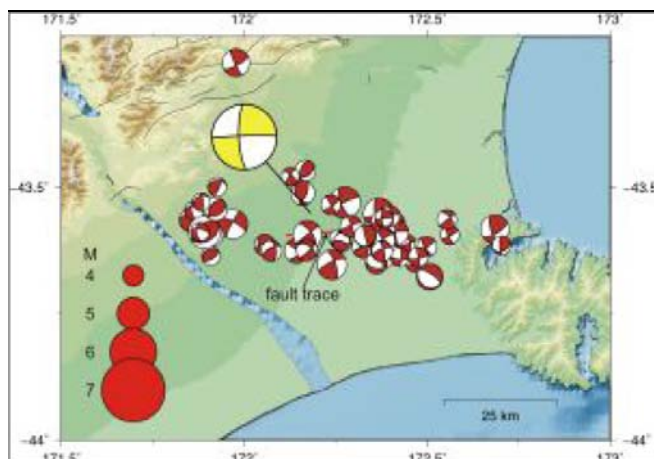
Εικόνα 5. Κατανομή των epicenters των επιφανειακών σεισμών της τελευταίας δεκαετίας (από www.gns.cri.nz)



Εικόνα 6. Χάρτης με τα ενεργά ρήγματα της Νέας Ζηλανδίας (από www.gns.cri.nz)

Προφανώς πρόκειται για ένα ρήγμα «κρυμμένο», λόγω κάλυψής του από τις ποτάμιες αποθέσεις της πεδιάδας του Canterbury και την επιφάνεια ισοπέδωσης παγετώδους προέλευσης που αναφέρεται ως ηλικίας 18000 ετών (Εικόνα 4). Παρόμοιο ήταν και το ρήγμα του σεισμού του 1931 στο Hawke's Bay, ο οποίος είχε 256 θύματα και προξένησε μεγάλες καταστροφές. Οι περιπτώσεις αυτές των «τυφλών» ή καλυμμένων ρηγμάτων δείχνουν ότι σε περιοχές σεισμικές απαιτείται συνεχής έρευνα και συνδυασμένα γεωλογικά, γεωφυσικά και σεισμολογικά στοιχεία για να δώσουν την πραγματική εικόνα των κρίσιμων ρηγμάτων. Κι αυτό γιατί ορισμένα ρήγματα μπορεί να έχουν περίοδο επανάληψης αρκετές χιλιάδες χρόνια αλλά η επόμενη ανάδρασή τους να είναι «αύριο», αφού η γη δεν ακολουθεί πάντα τους κανόνες ενός εργαστηρίου, αλλά λόγω αποκλίσεων χαρακτηρίζεται από αβεβαιότητες, αυξάνοντας την διακινδύνευση μιας περιοχής.

Σύμφωνα με την επίλυση του μηχανισμού γένεσης (Εικόνα 7) ο σεισμός συνδέεται με την δράση ρήγματος οριζόντιας ολίσθησης που βρίσκεται στον φλοιό της Ειρηνικής πλάκας. Πρόκειται για δεξιόστροφο ρήγμα οριζόντιας ολίσθησης με διεύθυνση περίπου Α-Δ, όπως επιβεβαιώνεται και από τις παρατηρήσεις της επιφανειακής εκδήλωσης του ρήγματος, που αναπτύσσεται σε ένα συνολικό μήκος 23 km περίπου (Εικόνα 4). Οι περισσότεροι από τους μετασεισμούς κοντά στο επίκεντρο είχαν παρόμοιους μηχανισμούς γένεσης. Προς το δυτικό τμήμα του ρήγματος διαπιστώθηκε μία ισχυρή συνιστώσα ανάστροφης κίνησης.



Εικόνα 7. Ο μηχανισμός γένεσης του κύριου σεισμού (μεγάλη μπάλα) και των κυριότερων μετασεισμών (από www.geonet.org.nz)

Σύμφωνα με τις παρατηρήσεις υπαίθρου, η οριζόντια μετατόπιση ήταν της τάξεως των 3 μέτρων και η κατακόρυφη λίγες δεκάδες εκατοστά (Εικόνες 8, 9, 10, 11). Η ζώνη παραμόρφωσης είχε πλάτος κυμαινόμενο από 10 έως μερικές δεκάδες μέτρα (Εικόνες 12 και 13). Χαρακτηριστική εικόνα της ανάστροφης συνιστώσας δίνεται στην εικόνα 14.

ΔΕΥΤΕΡΟΓΕΝΗ ΣΕΙΣΜΙΚΑ ΦΑΙΝΟΜΕΝΑ

Πολύ εκτεταμένα φαινόμενα ρευστοποίησης σημειώθηκαν κατά τη διάρκεια του σεισμού (Εικόνες 15 και 16), οφειλόμενα στη αμώδη ομοιόμορφη σύσταση των εδαφικών σχηματισμών και στο κορεσμό τους λόγω του πολύ υψηλού υδροφόρου ορίζοντα (ένα ποσοστό περί τα 20-30% ιλύος εκτιμήθηκε ότι υπάρχει). Στις αγροτικές περιοχές, που υπήρχε η δυνατότητα καλής παρατήρησης, διαπιστώθηκαν οι χαρακτηριστικές μορφές των «ηφαιστειών λάσπης» και «αναβράσεων εδάφους» (Εικόνα 17), ενώ στις κατοικημένες περιοχές οι εδαφικές αστοχίες από ρευστοποίηση, συχνά με διαφορική συμπεριφορά προκάλεσαν σημαντικές βλάβες στα κτίρια (Εικόνες 18, 19). Μεγάλες ζημιές παρατηρήθηκαν επίσης στα αναχώματα που υπήρχαν στις παραποτάμιες κυρίως περιοχές, λόγω «πλευρικής εξάπλωσης» (lateral spreading) (Εικόνες 20, 21, 22). Η πλευρική εξάπλωση εκ-

δηλούτο ακόμη και όταν η μορφολογία του εδάφους που την προκαλούσε ήταν πολύ μικρή (μερικές δεκάδες εκατοστά). Οι ρωγμές της πλευρικής εξάπλωσης έφθαναν σε περιοχές και πέραν των 100 μέτρων, πίσω από τα χαμηλά σημεία του αναγλύφου που την προκάλεσαν. Χαρακτηριστικά είναι τα λόγια ενός κοριτσιού από την πόλη Christchurch, όταν ρωτήθηκε από δημοσιογράφο πως αντιλήφθηκε το σεισμό. "The ground moved like jelly", ήταν η απάντησή της.



Εικόνα 8. Αεροφωτογραφία όπου διακρίνεται η χαρακτηριστική «en echelon» πορεία του ρήγματος



Εικόνα 9. Οριζόντια μετατόπιση δρόμου και δενδροστοιχίας στη διέλευση του ρήγματος



Εικόνα 10. Οριζόντια μετατόπιση δρόμου στη διέλευση του ρήγματος



Εικόνα 11. Κατακόρυφη μετατόπιση της τάξεως των λίγων δεκάδων εκατοστών περίπου, τοπικά στη ζώνη του ρήγματος



Εικόνα 12. Η ζώνη της εδαφικής παραμόρφωσης στην επιφανειακή εκδήλωση του σεισμικού ρήγματος



Εικόνα 13. Η ζώνη της εδαφικής παραμόρφωσης στην επιφανειακή εκδήλωση του σεισμικού ρήγματος που διασχίζει δρόμο



Εικόνα 14. Ενδείξεις ανάστροφης κίνησης στο δυτικό τμήμα της επιφανειακής διάρρηξης



Εικόνα 15. Εκτεταμένα φαινόμενα ρευστοποίησης κοντά στον ποταμό Waimakariri



Εικόνα 16. Εδαφική ρωγμή από πλευρική εξάπλωση λόγω ρευστοποίησης κοντά στον ποταμό Waimakariri



Εικόνα 19. Καταστροφές σε οικία λόγω της «άφιξης» των ρωγμών και πλευρικής εξάπλωσης (lateral spreading)



Εικόνα 17. Χαρακτηριστικές μορφές των «ηφαιστειών λάσ-
νης» στην περιοχή του ποταμού Waimakariri



Εικόνα 20. Επιμήκειες ρωγμές σε αναχώματα λόγω πλευρικής
εξάπλωσης στις όχθες του ποταμού Waimakariri



Εικόνα 18. Βλάβες στο οδόστρωμα λόγω των φαινομένων
ρευστοποίησης και πλευρικής εξάπλωσης



Εικόνα 21. Εγκάρσιες ρωγμές σε αναχώματα λόγω ρευστο-
ποίησης και πλευρικής εξάπλωσης, κοντά στον ποταμό
Waimakariri



Εικόνα 22. Βύθιση τμήματος παραποτάμιας περιοχής λόγω της «πλευρικής εξάπλωσης», όπως φαίνεται και από τα δένδρα που μετά το σεισμό βρέθηκαν μέσα στα νερά του ποταμού. Διακρίνεται ελαφρώς στα δεξιά της εικόνας η πρώτη ρωγμή του φαινομένου

ΒΛΑΒΕΣ ΣΤΟ ΔΟΜΗΜΕΝΟ ΠΕΡΙΒΑΛΛΟΝ

Ένα από τα μαθήματα που έδωσε ο σεισμός σε ότι αφορά τα κτίρια είναι ότι σε όσα, κυρίως ιστορικά και παλαιά κτίρια, είχαν προηγηθεί εργασίες ενίσχυσης άντεξαν το σεισμό, ενώ πολλά άλλα έπαθαν μεγάλες ζημιές ή κατέρρευσαν. Καλύτερα ανταποκρίθηκαν, όπως ήταν φυσικό, τα ξύλινα κτίρια (και ήταν πολλά) τα οποία ακόμη και αν μετατοπίστηκαν από τη βάση τους ή έπαθαν διαφορική καθίζηση λόγω της ρευστοποίησης, δεν κατέρρευσαν. Η μη συνεχής δόμηση σε μεγάλη έκταση στον αστικό χώρο, συνέβαλε επίσης στον περιορισμό των δομικών βλαβών. Μεγάλο πρόβλημα προκλήθηκε από καταστροφές στο δίκτυο ύδρευσης και αποχέτευσης, με αποτέλεσμα να υπάρξει μόλυνση του πόσιμου νερού. Ορισμένες φωτογραφίες από τις βλάβες δίνονται στις εικόνες 23, 24 και 25.



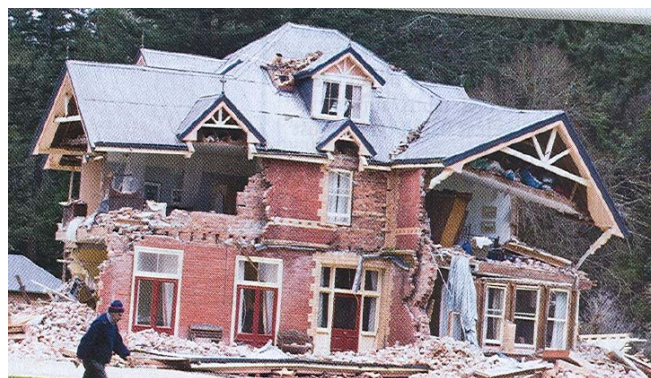
Εικόνα 23. Χαρακτηριστική παραμόρφωση (λύγιση) των σιδηροδρομικών γραμμών

ΣΥΝΟΨΗ - ΣΥΜΠΕΡΑΣΜΑΤΑ

Σύμφωνα με τις εκτιμήσεις των ειδικών για τις οικονομικές και κοινωνικές επιπτώσεις του σεισμού μεγέθους 7,1 στο Canterbury, στο νότιο νησί της Νέας Ζηλανδίας, το κόστος αναμένεται να φθάσει στα 4 δις δολάρια, ενώ το 20% των σπιτιών της περιοχής έχουν καταστεί μη κατοικήσιμα. Σημειώνεται εδώ ότι εκτός από τις άλλες επιπτώσεις του σεισμού, οικονομικό κόστος προκλήθηκε στην αγροτική παραγωγή και από το γεγονός ότι ένα μεγάλο πλήθος αγελάδων που κυοφορούσαν απέβαλαν κατά τη διάρκεια του σεισμού.



Εικόνα 24. Καταστροφή πεζογέφυρας στο Καίαιροί.



Εικόνα 25. Καταστροφή κατοικίας στα περίχωρα του Darfield. Πρόκειται για το σπίτι της κινηματογραφικής ταινίας «ο άρχοντας των δακτυλιδιών»

Οι πόλεις που κτυπήθηκαν περισσότερο ήταν το Darfield, το Καίαιροί και το κέντρο του Christchurch. Το αεροδρόμιο, οι κύριοι αυτοκινητόδρομοι και ο σιδηρόδρομος έκλεισαν μόνο προσωρινά. Ο σεισμός έγινε αισθητός και στο βόρειο νησί, σε απόσταση 800 km περίπου μακριά από το επίκεντρο. Αξίζει να σημειωθεί ότι οι κάτοικοι των περιοχών που επλήγησαν έδειξαν μεγάλη ψυχραιμία και πολλοί επισκέπτοντο τις περιοχές με τις εδαφικές παραμορφώσεις θέλοντας να μάθουν και να γίνουν πιο οικείοι με το φυσικό φαινόμενο, ενώ και η πολιτεία ανταποκρίθηκε αμέσως στις ανάγκες που προέκυψαν. Υπήρχε η πρόβλεψη ώστε να είναι ήδη έτοιμα μεγάλα υπαίθρια κλειστά καταφύγια τα οποία κάλυψαν με υποδειγματική τάξη τις ανάγκες των αστέγων. Διαπιστώθηκε επίσης ότι κτίρια ιστορικά στα οποία είχε γίνει ενίσχυση ανταποκρίθηκαν πολύ καλά στο σεισμό.

Όπως όλοι οι ειδικοί επιστήμονες συμφωνούν, και είχαμε επίσης την ευκαιρία να διαπιστώσουμε, οι χειρότερες καταστροφές που παρατηρήθηκαν δεν οφείλονται μόνο στις σεισμικές δονήσεις αλλά κυρίως στα εκτεταμένα φαινόμενα ρευστοποίησης και την συμπαρομαρτούσα πλευρική εξάπλωση, που σημειώθηκαν στην επικεντρική περιοχή. Πρόκειται για πεδινή περιοχή καλυμμένη με ποτάμιες αμμόδεις, ομοιόμορφης κοκκομετρίας, μη συνεκτικές αποθέσεις στην οποία ο υδροφόρος ορίζοντας είναι πολύ ψηλά, συνθήκες δηλαδή πολύ ευνοϊκές για ρευστοποίηση.

Ο σεισμός συνδέεται με την ανάδραση δεξιόστροφου ρήγματος οριζόντιας ολίσθησης, το οποίο θεωρήθηκε «τυφλό», μη έχοντας ίχνος στην επιφάνεια του εδάφους. Τα στοιχεία του ρήγματος όπως δίνονται από τον μηχανισμό γένεσης του σεισμού αναγνωρίζονται και από τις παρατηρήσεις υπαίθρου. Πρόκειται για ρήγμα καλυμμένο κάτω από τις νεότερες απόθέσεις της πεδιάδας, το οποίο όμως με το σεισμό εμφανίστηκε στην επιφάνεια του εδάφους, σε ένα συνολικό μήκος περί

τα 23 km. Η οριζόντια συν-σεισμική μετατόπιση έφθασε τα 3 – 3.5 μέτρα και η κατακόρυφη ήταν λίγες δεκάδες εκατοστά, ενώ τοπικά έφθασε το ένα μέτρο. Το πλάτος της ζώνης με τις εδαφικές διαρρήξεις έφθανε σε αρκετές δεκάδες μέτρα (10-40 μέτρα στις περιοχές που επισκεφθήκαμε).

Για τους σεισμολόγους και γεωλόγους της Νέας Ζηλανδίας, παρότι περίμεναν στο Νότιο νησί ένα μεγαλύτερο ακόμη σεισμό στο μεγάλο ρήγμα των νοτίων Άλπεων, ο συγκεκριμένος σεισμός σε ένα άγνωστο ρήγμα αποτέλεσε μία έκπληξη. Τελικά, τέτοιες εκπλήξεις δεν είναι πράγματι εκπλήξεις σε όλες τις σεισμικές χώρες, όπως και στην Ελλάδα (σεισμοί Κοζάνης, Πάρνηθας), αφού η φύση αρέσκεται να κρύβει τα μυστικά της. Μόνο με τη συνεχή έρευνα και τη διεπιστημονική συνεργασία μπορούμε να κατανοήσουμε ένα μέρος από τις γεωδυναμικές διεργασίες της γης και τη σεισμική της συμπεριφορά, προς την κατεύθυνση της μείωσης των επιπτώσεων από τους σεισμούς και στόχο κυρίως την προστασία και την ελαχιστοποίηση των ανθρώπινων απωλειών. Έτσι, και λαμβάνοντας υπόψη το γεγονός ότι στο σεισμό του Canterbury δεν υπήρξε ούτε ένα ανθρώπινο θύμα, μπορούμε να πούμε ότι επισκεψή μας στην επικεντρική περιοχή ήταν για μας μία σπουδαία εμπειρία.



Read the diary of an ASCE team studying New Zealand's earthquake damage

On Sept. 3, a magnitude 7.1 earthquake struck the eastern side of New Zealand, causing significant damage. Two ASCE technical assessment teams have arrived at the scene west of Christchurch and are studying the quake's effects on the region's infrastructure systems. Follow the Structural Engineering Institute team's experiences and findings in a first-person diary by team leader Bob Pekelnicky, P.E., S.E., of Degenkolb Engineers in San Francisco.

<http://www.asce.org/PPLContent.aspx?id=12884902056>



Canterbury's masonry churches battered

While the seismically strengthened Anglican Cathedral and Catholic Basilica in Christchurch fared relatively well in last month's quake, other Canterbury churches built before the 1931 Napier earthquake have not been so lucky. Churches as far from the epicentre as Timaru have been affected by the quake and the over 1760 aftershocks that have followed.

Anglican churches throughout Canterbury have been hard hit. In the central city the 1865 Category 1 St John's Latimer Square lost tonnes of masonry from its bell tower leaving its bell exposed to the open air, with cracks running through the structure and St Luke's Manchester Street (1909, Category 2) has lost stone from one gable. In suburban Christchurch, Holy Trinity Avonside has cracking in the 1876 chancel and transepts.

St Mary's Merivale's (1927, Category 2) along with its vicarage and hall have been listed as unsafe by Civil Defence. The 1926 Category 1 St Barnabas, Fendalton has significant cracks in its walls forcing the congregation to meet in the parish hall.



The 1869 Church of the Holy Trinity, 1882 Oxford Terrace Baptist Church

On the peninsula, both the Category 1 Holy Trinity Lyttelton (1860) and St Cuthbert's Governor's Bay (1860 Category 1) have damage to masonry walls, but more significantly in both cases, their stained glass windows are threatened.



The damaged chancel of St Cuthbert's Governor's Bay

The 1869 Church of the Holy Innocents, (Category 2) on the Acland estate at Mt Peel has damage to the stone wall behind the altar and has lost the memorial window over the altar commemorating John and Emily Acland.

The 1863 St John's Okain's Bay, (Category 2) has sustained serious damage to one gable end.

Christchurch's Baptist heritage is in jeopardy as the fate of the Oxford Terrace Baptist Church is evaluated.



The Durham Street Methodist church (above) is badly damaged and its future is currently uncertain, as is that of the Cat 2 former St Alban's Methodist Church, (1895), (below) now the Chinese Methodist Church in Papanui Road. The spire of the church has been removed to ensure its safety.



In South Canterbury, stone finials were displaced on the tower of St Mary's Timaru (1880 Category 1).

Christchurch's Catholic Cathedral of the Blessed Sacrament is not currently able to be used and may be out of action for 12 months. Seismic strengthening was undertaken there four years ago and this effectively saved the building.

Two other Catholic churches suffered major damage: St Paul's, Dallington and Our Lady Star of the Sea, Sumner are unusable. St Paul's is to be demolished.

Eleven other Catholic churches suffered moderate damage. Amongst these are St Joseph the Worker, Lyttelton (1865 Category 2) St John the Evangelist, Little River (1924, Category 2) St Joseph's, Temuka (1879-82, Category 2) St Mary's, Pleasant Point (1889, Category 2). The Church of the Holy Name, Ashburton, 70 km from the epicentre, (1931 Category 1) suffered minor damage.

(David Reynolds, ICOMOS New Zealand News, 13 October 2010)

ΜΠΑΡΑΖ ΦΥΣΙΚΩΝ ΚΑΤΑΣΤΡΟΦΩΝ ΣΤΗΝ ΙΝΔΟΝΗΣΙΑ

Εκατοντάδες οι νεκροί από τον σεισμό, το τσουνάμι, την ηφαιστειακή έκρηξη και τις καταρρακτώδεις βροχές που πλήττουν την Ινδονησία την τελευταία εβδομάδα.

Magnitude 7.7 Earthquake - KEPULAUAN MENTAWAI REGION, INDONESIA

Earthquake Details

Magnitude 7.7

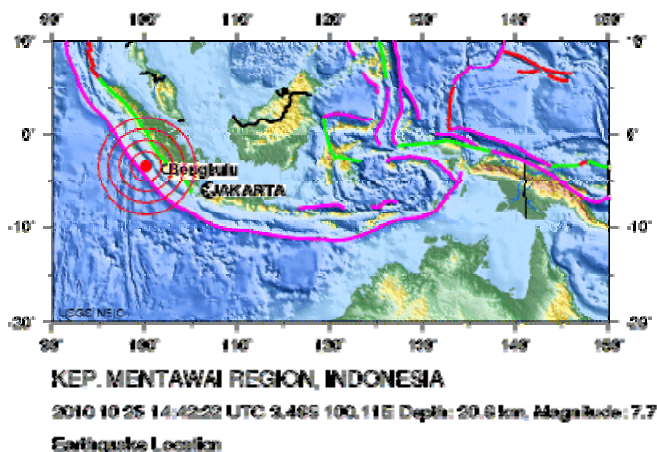
Date-Time Monday, October 25, 2010 at 14:42:22 UTC
(09:42:22 PM at epicentre)

Location 3.484°S, 100.114°E

Depth 20.6 km (12.8 miles)

Region KEPULAUAN MENTAWAI REGION, INDONESIA

Distances 240 km (150 miles) W of **Bengkulu, Sumatra, Indonesia**
280 km (175 miles) S of **Padang, Sumatra, Indonesia**
305 km (190 miles) W of **Lubuklinggau, Sumatra, Indonesia**
795 km (500 miles) WNW of **JAKARTA, Java, Indonesia**



Tectonic Summary



The Pulau Pagai Selatan, Sumatra earthquake of October 25, 2010 occurred as a result of thrust faulting on or near the subduction interface plate boundary between the Australia and Sunda plates. At the location of this earthquake, the Australia Plate move north-north-east with respect to the Sunda plate at a velocity of approximately 57-69 mm/yr. On the basis of the currently available fault mechanism information and earthquake depth it is likely

that this earthquake occurred along the plate interface. The subduction zone adjacent to the region of this event last slipped during the Mw 8.5 and 7.9 earthquakes of September 2007, and today's event appears to have occurred near the rupture zones of those earthquakes. Today's earthquake is the latest in a sequence of large ruptures along the Sunda mega-thrust, including a M 9.1 earthquake that ruptured to within 800 km north of this earthquake in 2004; a M 8.6 700 km to the north between Nias and Simeulue in 2005; and a M 7.5 300 km to the north near Padang in 2009. Today's earthquake occurred near the southern edge of a Mw 8.7-8.9 rupture in 1797 and within the rupture area of a Mw 8.9-9.1 earthquake in 1833.

(USGS, 25 October 2010)



Padang, Indonesia (CNN) -- At least 311 people have died in a magnitude-7.7 earthquake off Indonesia and the subsequent tsunami, said the head of West Sumatra's disaster management agency Wednesday. Another 410 people are still missing.

Rescuers and aid workers were struggling to reach the victims in the remote, hard-hit Mentawai Islands region of Indonesia.

The worst hit area is North and South Pagai Island. Reports of villages flattened are coming from there.

The first pictures from North Pagai Island showed damaged and flattened structures.

Monday's quake generated a "significant" tsunami, the Pacific Tsunami Warning Center said. Some of the missing people who are unaccounted for after fleeing to higher ground, said an official.

Though communication poses a challenge in the remote area, some witnesses in West Sumatra reported seeing a wave 6 meters (nearly 20 feet) high. Other reports described the tsunami as being about 3 meters (almost 10 feet) high.

At least one village with a population of about 200 people was swept away, with only 40 people recovered, Satoko said.

(CNN Wire Staff, October 27, 2010)

Day after tsunami strikes Indonesia, volcano erupts

PADANG, INDONESIA - Rescuers battled rough seas Tuesday to reach remote Indonesian islands pounded by a 10-foot tsunami that swept away homes, killing at least 113 people. Scores more were missing, and information was just beginning to trickle in from the sparsely populated surfing destination, so casualties were expected to rise.

With few able to get to the islands to help search, fishermen were left to find the dead and look for the living.

Corpses were strewn about because there were not enough people to dig graves, according to the Mentawai district chief, Edison Salelo Baja.



Mount Merapi spews volcanic smoke as seen from Balerante, Central Java, Indonesia, Tuesday Oct. 26, 2010. Pressure building beneath a lava dome in the mouth of Indonesia's most volatile volcano could trigger one of its deadliest blasts in years, scientists warned Tuesday, as residents living along the slopes were moved to temporary camps.

The fault that ruptured Monday off the island of Sumatra was the same one that caused the earthquake and monster Indian Ocean tsunami that killed 230,000 people in a dozen countries in 2004.



Rescuers search for victims at a village hit by pyroclastic flows from Tuesday's eruption of Mount Merapi.



A village that was hit by pyroclastic flows from Mount Merapi is pictured in Kinahrejo, Yogyakarta, Indonesia.

Also Tuesday, Indonesia's most volatile volcano erupted, killing at least 18 people, including a 2-month-old baby, according to doctors and media reports.

Smoke poured out of Mount Merapi, obscuring its cone, according to video footage shown on the private Metro TV station. Police and volunteers were shown carrying ash-covered corpses to waiting vehicles.



Although some scientists have said that the current activity could foreshadow a much more destructive explosion in the coming weeks or months, Gede Swantika, a government volcanologist, said the 9,737-foot-high mountain appeared to be releasing some pressure building up beneath the lava dome.

"It's too early to know for sure," he said, adding: "But if it continues like this for a while, we are looking at a slow, long eruption."

(John Nedi and Slamet Riyadi / The Washington Post, Wednesday, October 27, 2010)

ΠΡΟΣΚΛΗΣΕΙΣ ΓΙΑ ΣΥΜΜΕΤΟΧΗ ΣΕ ΕΡΕΥΝΗΤΙΚΑ ΠΡΟΓΡΑΜΜΑΤΑ

Development and implementation of technological innovation in underground construction in Europe

Tunconstruct is calling for contractors to apply for the next phase of funding as part of its multi-disciplinary research project to promote development and implementation of technological innovation in underground construction in Europe.

The programme has been set up to contribute to an increased quality of life for Europeans by reducing construction time and cost of planned and future underground infrastructures.

Phase 2 focuses on technology, developing TBMs, road-headers, shotcreting, materials, and ways to improve environmental impact and worker safety.

The previous consortium comprised 33 partners and seven clients from countries across Europe, and had a budget of EUR 26M (USD 35.7M) for four years from 2005 to 2009.

Gernot Beer, professor at Graz University of Technology, Austria, and the coordinator for Tunconstruct said for this phase the project is looking for very innovative opportunities and particularly for participation from larger, well-known companies in Europe.

In the previous consortium there was heavy participation from Spanish companies, he said. Though with the recession taking a toll on the construction industry, it is expected there will be a wider spread across Europe.

The project is co-financed by the European Commission, under its 6th framework program, which provides 54 per cent of the EUR 26M quadrennial budget.

Further information and contact details are available at www.tunconstruct.org.

(8 October, 2010)



www.terrafirma.eu.com

Terrafirma is one of ten services being supported by the European Space Agency's (ESA) Global Monitoring for Environment and Security (GMES) Service Element Programme. Terrafirma provides a ground motion hazard information service, distributed throughout Europe via national geological surveys and institutions.

The objective of this service is to help:

- Identify hazards
- Improve safety, and
- Mitigate risk

Terrafirma is based upon the revolutionary remote sensing technique of Persistent Scatterer Interferometry which has the power to map millimetric ground motion phenomena from space. PSI involves the processing of 50+ radar scenes from an archive dating back to 1991 to identify networks of reflecting ground features, such as buildings, bridges and other structures, against which precise phase measurements can be made over time. The results provide unique, wide-area maps of ground and building motion that can be difficult if not impossible to detect by conventional means. The service currently focuses on urban subsidence and landslides but will eventually include earthquake zones, coastlines and flood plains.

Terrafirma is operating in three discrete stages of 0-2, 2-5 and 5-10 years. The first two-year Stage 1 (which ended in 2005) was concerned with consolidation of both service providers and users. In November 2005 Terrafirma entered Stage 2, concerned with rolling-out the service across all Member States of the EC. During this stage, processing equally covering all of the EU25 Member States will be conducted along with the processing of seven landslide products within Greece, Italy and Switzerland. Stage 3 began in December of 2009 and will continue until the end of 2012. This third and final stage focuses on several thematic lines for terrain motion analysis:

- Tectonics
- Flooding
- Hydrogeology
 - Ground water issues
 - Landslides
 - Inactive mines
- Wide Area Mapping service



WORKSHOP CONTACT : Marie-Josée Banwell
marie-josee.banwell@altamira-information.com

WORKSHOP REGISTRATION
www.terrafirma.eu.com/workshop

BACKGROUND

Terraforma is an ESA GMES project which combines the power of Persistent Scatterer Interferometry with national geophysical expertise to provide a pan-European ground motion hazard information service. During this third, three-year stage of the project the work is focused onto three thematic lines for which specific interpreted products have been developed. The service delivery is specific to one of the following thematic: flood, tectonics and hydrogeology (groundwater, abandoned/reactive mines, landslides).

The 6th Terraforma User Workshop will bring together all those who have worked on Terraforma products, to make presentations of their interpretations, together with users, researchers and other interested parties who are particularly welcome to join us and share in the applications and understanding of ground movement monitoring which are emerging from this state-of-the-art satellite technology.

The Terraforma Training Day will provide hands-on instruction on the practical application of Terraforma products.

WORKSHOP PARTICIPATION

The workshop is open to all those interested in the management of terrain motion and related geohazards. It is not restricted to just Terraforma partners.

TRAINING DAY PARTICIPATION

There is limited availability for the Terraforma Training Day and places will be allocated on a first come first served basis, with a maximum of 2 places per institution.

OBJECTIVES

Objectives of the 6th Terraforma User Workshop and Training Day are to:

- Share in a broad range of Terraforma results covering differing geohazard phenomena within the three thematic lines: flood, tectonics and hydrogeology.
- Benefit from understanding the different types of interpretation of PSI that have been made.
- Gain a better understanding of PSI application.
- Provide a forum for networking and communication with like-minded colleagues in the geohazard community.
- Increase user understanding of the PSI technique and enhance user knowledge of how to use the Terraforma products.

PROGRAMME AND ABSTRACT SUBMISSION

The workshop is organised around presentations and showcases of the Terraforma products and interpretations made by Terraforma partners and users of Persistent Scatterer InSAR results from around Europe. These results are focused on the three Terraforma themes: Flood, Tectonics and Hydrogeology (groundwater management, landslides and abandoned/inactive mines). All Terraforma 'recipients' (user signatories to Service Level Agreements) are invited to present their findings, although, as presentation time is limited, abstracts will be accepted on a first come, first served basis. Please forward abstracts or ideas for presentations to Marie-Josée Banwell at Altamira (marie-josée.banwell@altamira-information.com).

SCHEDULE

1 st Announcement:	August 2010
Free Registration opens:	August 2010
Submission of abstracts:	15 th October 2010
Notification of acceptance:	November 2010
Release of final programme:	November 2010
Workshop:	1 st December 2010
PSI training day:	2 nd December 2010
Publication of presentations:	January 2011

The official language of the workshop will be English.
No participation fees will be charged, though participants are expected to finance their own travel and accommodation expenses.

προβληματισμοί για την συμπεριφορά των φίλτρων μακροχρόνια.

Μετά από σύντομη διερεύνηση στην Ελλάδα αλλά και διεθνώς, προέκυψε ότι η υφιστάμενη εμπειρία για το θέμα αυτό είναι περιορισμένη. Για το λόγο αυτό παρακαλούνται όσα από τα μέλη μας διαθέτουν τυχόν κάποια ειδική εμπειρία ή γνώση στο αντικείμενο αυτό, ή μπορούν να υποδείξουν κάποιους ειδικούς οι οποίοι αποδεδειγμένα να τη διαθέτουν, να έλθουν σε επαφή με την ΕΕΜΦ για να διευκολύνουν την πρόοδο της σχετικής διερεύνησης. Επίσης, είναι ευπρόσδεκτες υποδείξεις ή προτάσεις για οργανωτικά και οικονομικά θέματα σχετιζόμενα με την παραπάνω έρευνα (πηγές χρηματοδότησης, συμμετοχή εκπαιδευτικών ιδρυμάτων, διαθεσιμότητα εργαστηρίων κλπ).

Κ. ΑΝΑΣΤΑΣΟΠΟΥΛΟΣ
Πρόεδρος ΕΕΜΦ

Στο ερευνητικό αυτό πρόγραμμα από ελληνικής πλευράς συμμετέχει το γραφείο μελετών ΣΤΑΜΑΤΟΠΟΥΛΟΣ & ΣΥΝΕΡΓΑΤΕΣ Ε.Π.Ε.



ΕΛΛΗΝΙΚΗ ΕΠΙΤΡΟΠΗ ΜΕΓΑΛΩΝ ΦΡΑΓΜΑΤΩΝ
(ΜΕΛΟΣ ΤΗΣ ΔΙΕΘΝΟΥΣ ΕΠΙΤΡΟΠΗΣ ΜΕΓΑΛΩΝ ΦΡΑΓΜΑΤΩΝ)

ΑΘΗΝΑ, 26/10/2010
Α.Π. ΕΕΜΦ : 159/26.10.2010

Αγαπητά μέλη

Η ΕΕΜΦ διερευνά τη δυνατότητα σύστασης Ομάδας Εργασίας για την έρευνα της μακροχρόνιας συμπεριφοράς θραυστών φίλτρων από ασβεστολιθικά υλικά στα φράγματα. Το θέμα αυτό κρίνεται ως ιδιαίτερα σημαντικό, λόγω εξάντλησης / απουσίας αποθεμάτων ή και περιβαλλοντικών περιορισμών, που καθιστούν ολοένα και δυσκολότερη την εκμετάλλευση αμμοχαλίκων ποταμών, τα οποία παραδοσιακά αποτελούσαν την κύρια πηγή απόληψης για την παραγωγή φίλτρων στα φράγματα. Σημειώνεται ότι στη διεθνή βιβλιογραφία διατυπώνονται φόβοι (τους οποίους, από σχετικές συζητήσεις, συμμερίζονται πολλά μέλη μας) για ανάπτυξη συνοχής στα υλικά αυτά με την πάροδο του χρόνου (λόγω συγκόλλησης των κόκκων, απόθεσης αλάτων από την κυκλοφορία νερού κλπ), με συνέπεια να τίθενται και αντίστοιχοι

ΒΡΑΒΕΥΣΕΙΣ ΓΕΩΤΕΧΝΙΚΩΝ ΕΠΙΣΤΗΜΟΝΩΝ

Glory of India Award για τον Sarada Sarma

Ο Dr. Sarada Sarma, Emeritus Reader και Senior Research Fellow του Department of Civil and Environmental Engineering του Imperial College, παρά τον οποίο μαθήτευσαν πολλοί συνάδελφοι στα πλαίσια των μεταπτυχιακών σπουδών τους στους τομείς Soil Mechanics, Soil Mechanics and Engineering Seismology και Soil Mechanics and Environmental Geotechnics, τιμήθηκε από την India International Friendship Society με την "Glory of India Award" για:



"You have etched your own distinct identity – socially and economically by the virtue of your own excellence. In the Indian context you have been proactive and instrumental in strengthening the Indo-British ties and encouraging foreign investments in Indian projects and thus contributing to the economic growth of India. We cordially invite you to participate in the Banquet function on 25th September 2010 in London and receive the "Glory of India Award" personally".

ΠΡΟΣΕΧΕΙΣ ΓΕΩΤΕΧΝΙΚΕΣ ΕΚΔΗΛΩΣΕΙΣ

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

4th International Conference in Geotechnical Engineering and Soil Mechanics, November 2nd & 3rd 2010, Tehran, Iran, www.icgesm2010.ir

BRIDGES EUROPE, 3 - 5 November, 2010, Warsaw, Poland, <http://www.iqpc.com/Event.aspx?id=332758>

31. BAUGRUNDTAGUNG mit Fachausstellung Geotechnik, 3 - 6 November 2010, ICM München, www.baugrundtagung.com

SECED YOUNG ENGINEERS CONFERENCE, 4 November 2010, University College of London, www.cege.ucl.ac.uk/events/yec

BANGLADESH GEOTECHNICAL CONFERENCE 2010 Natural Hazards and Countermeasures in Geotechnical Engineering, 4-5 November, 2010, Dhaka, Bangladesh, bsge.hgs@gmail.com, Bgc2010dhaka@gmail.com

International Conference on Geotechnical Engineering, 5 - 6 November 2010, Lahore, Pakistan, hamid833@hotmail.com, hamid.queeshi@nespak.com.pk

ICSE-5 5th International Conference on Scour and Erosion, 7 - 10 November 2010, San Francisco, USA, www.icse-5.org



INTERNATIONAL NO-DIG 2010
28th International Conference & Exhibition
8-10 November 2010, Singapore
www.nodigsingapore.com

The spotlight will be on Singapore as it hosts 2010's most prestigious and exciting forum for trenchless technologists at ISTT's 28th INTERNATIONAL NO-DIG 2010 Conference and Exhibition, 8-10 November this year.

No-Dig technology has made huge advances in recent years. There is increasing pressure from authorities around the world for contractors to utilise these modern engineering methods to minimise disruption during the installation and refurbishment of underground services.

This is a developing global industry. Products and techniques are reviewed and improved on a regular basis. New innovations are proven to enhance performance. Major projects are completed every day somewhere around the world, proving that trenchless techniques provide economic solutions and reduced environmental impact. The social costs are reduced, benefiting business communities, as well as the travelling public.

Speakers from some 23 countries are gathering together to share their knowledge and expertise on new products, techniques and research programmes. Experience of the challenges and solutions encountered in many engineering projects will be recounted. Attendance at the conference is a must to get up to date on all that's new and being developed in this specialised field.

INTERNATIONAL NO-DIG 2010 is organised on behalf of International Society for Trenchless Technology (ISTT) by WRSTRIDE GROUP LTD
112-114 High Street
Rickmansworth
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Tel: +44 (0) 845 094 8066
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Email: trenchless@westrade.co.uk
Web: www.westrade.co.uk



ISFOG 2010 2nd International Symposium on Frontiers in Offshore Geotechnics, 8 - 10 November 2010, Perth, Western Australia, w3.cofs.uwa.edu.au/ISFOG2010

6ICEG 2010 - Sixth International Congress on Environmental Geotechnics, November 8 - 12, 2010, New Delhi, India www.6iceg.org

3rd INTERNATIONAL CONFERENCE Geosynthetics Middle East / Waterproofing Systems and Reinforced Structures 9 and 10 November 2010, Abu Dhabi, UAE, www.skz.de/shop



All Russia Scientific and Technical Conference
Devoted to 100 Anniversary of Prof. Boris I. Dalmatov
10-12 November 2010, St. Petersburg, Russia

Organizer: Russian Society for Soil Mechanics, Geotechnics and Foundation Engineering and St. Petersburg State Architectural and Civil Engineering University (SPBGASU)

Contact person: Prof. R.A.Mangushev
Address: 190005, St. Petersburg, 2-d Krasnoarmejskaja, building 4
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**Tunnelling in Difficult Ground Conditions -
an International NATM Workshop
11-12 November 2010, Singapore
www.srmeq.org.sg**

This workshop is organized by the Society for Rock Mechanics & Engineering Geology of Singapore and the Austrian Society for Geomechanics. The workshop aims to present and discuss systematically the New Austrian Method of Tunnelling (NATM), as it is practised in Austria and worldwide. The main theme will be "Tunnelling in difficult ground conditions." With the expected acceleration of underground space development in Singapore and many other countries, it is important for regulators, planners, developers, engineers and contractors to have a comprehensive understanding of what NATM encompasses as a tunnelling method. In this workshop, we bring in a panel of distinguished experts and practitioners to share with us their knowledge and experience in the essential aspects of NATM.

The Workshop Topics are:

- Historical and Theoretical Background of NATM
- Investigation and Design Methods and Standards
- Excavation and Support Strategies
- Monitoring and Data Interpretation
- Project Management, Contractual Practice and Risk Management
- Applications & Case Studies

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**PILING & DEEP FOUNDATIONS NORTH AFRICA, 22 - 25
November, 2010, Cairo, Egypt,
www.pilingfoundationsnorthafrica.com**

**ΠΕΜΠΤΟ ΠΑΝΕΛΛΗΝΙΟ ΣΥΝΕΔΡΙΟ ΛΙΜΕΝΙΚΩΝ ΕΡΓΩΝ, Αθήνα,
22-25 ΝΟΕΜΒΡΙΟΥ 2010, lh@central.ntua.gr, anastasiaki@hydro.civil.ntua.gr**



**9th International Symposium of Structures,
Geotechnics and Construction Materials
23-26 November 2010, Clara, Cuba
www.uclv.edu.cu**

Organizer: Facultad Construcciones, UCLV

Address: UCLV, Facultad de Construcciones
Carretera a Camajuani km 5. 1/2
54830 Santa Clara
Villa Clara
Cuba
Phone: 53 42 205872

Fax: 53 42 281655
E-mail: ana@uclv.edu.cu



**Tunnel Design & Construction Northeast Asia, 24 & 25 November,
2010, Hong Kong,
www.tunneldesignconstruction.com**



**7th WBI-International Shortcourse
Rock Mechanics, Stability and
Design of Tunnels and Slopes
November 25 - 29, 2010, Aachen, Germany
www.wbionline.de**

To give all our colleagues the opportunity to improve their knowledge in our view on rock mechanics and tunnelling we will offer the 7th international shortcourse in our WBI-Office building in Aachen on November 25 until November 29, 2010. On the first day of the shortcourse we will deal with the fundamentals of rock mechanics. We will address structural models, the stress-strain-behavior and the permeability of jointed rock as well as field and laboratory investigations and testing. Further more we will give attention to the fundamentals of the FE-method and the interaction of rock mass and support of a tunnel and slopes. Finally we will present examples for the application of the WBI-computer programmes FEST03 and HYD03. On the third and fourth day we will discuss several case studies with regards to the design of the support of tunnels and slopes. The workshop will be concluded with contributions with regards to risk management.

Program of the Shortcourse

Day 1: Jointed Rock - Fundamentals

- Structural Models
- Stress-Strain-Behavior
- Permeability
- Investigation and Testing
- Exercises (Mapping and Laboratory)
- Evaluation of Characteristic Parameters

Day 2: Tunnels - Stability and Seepage Analyses

- FE-Method, Fundamentals
- Interaction of Rock Mass and Support
- Examples and Exercises

Day 3: Tunnels - Design and Case Histories

NATM – Tunneling in Rock

- Excavation Methods (e.g. Drill and Blast)
- Temporary Face and Advancing Support
- Temporary Support and Final Lining

TBM – Tunneling in Rock

- TBM-Types
- Support of Temporary Face
- Design of Shield and Segmental Lining

Day 4: Slopes

Stability and Seepage Analyses

- Wedge-Type Analyses
- FE-Analyses
- Examples and Exercises

Design and Case Histories

- Stabilizing Measures (e. g. tendons)

Day 5: Dams and Special Aspects of Rock Mechanics

Dams and Dam Foundations - Design and Case Histories

Risk Analyses

Special Rock Types and Conditions - Swelling, Squeezing and Creeping

Economic Design of Structures in Rock - WBI-System and Rock Mass Classification

WBI GmbH

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Phone: +49 (0)2 41 - 8 89 87 - 0

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email: wbi@wbionline.de



Waterproof Mambranes 2010 - International business and technology conference on Waterproofing in Roofing and Geomembrane Liners 30 November - 2 December 2010, Cologne, Germany www.amiplastics.com

Geotechnical and Transportation Engineering, GEOTROPIKA 2010 "Sustainability in Geotechnical and Transportation Engineering", 1-3 December 2010, Sutera Barbour, Sabah, Malaysia seminar.spaceutm.edu.my/geotropika2010

VII Congresso Suramericano de Mecánica de Rocas - ISRM South American Regional Symposium 2010, 2 - 4 December 2010, Lima, Peru, eventos@iimp.org, asamaniego@svs.com.pe

Italian Geotechnical Journal – Special Issue on Seismic geotechnical design and retrofitting, agiroma.rig@iol.it

International Symposium on Geotechnical and Geosynthetic Engineering: Challenges and Opportunities on Climate Change, 7 to 8 December 2010, Bangkok, Thailand, www.set.ait.ac.th/acsig/climatechange

ISSMGE TC40 Forensic Geotechnical Engineering An International Symposium on FORENSIC GEOTECHNICS OF VI-BRATORY AND NATURAL HAZARDS, December 14-15, 2010, Mumbai, India, <http://www.geoengineer.org/events/FGEBrochure2010.pdf>

5th International Conference on Earthquake Geotechnical Engineering, Santiago, Chile, 10 - 13 January 2011, www.Sicege.cl



www.flacdemsymposium.com/index.php

Itasca will host the 2nd International FLAC/DEM Symposium on 14-16 February 2011 in Melbourne, Australia. The conference will feature topics and discussions covering the spectrum of Itasca software: FLAC, FLAC/Slope, FLAC3D, UDEC, 3DEC, PFC2D, and PFC3D. This conference, in considering all the codes, will offer a complete look at the state of numerical modeling with Itasca software.

Themes

- Slope Stability
- Soil-Structure Interaction
- Industrial Applications
- Petroleum Geomechanics
- Tunnel Design
- Fundamental Rock/Soil Mechanics
- Fracture Network Engineering
- Underground Mining
- Coupled Hydromechanical Analysis



**6th International
Conference on Dam Engineering
15-17th February 2011, Lisbon, Portugal**

<http://dam11.lnec.pt>

Following the success of the previous Conference and considering that the program for construction of Dams with High Hydroelectric Potential launched by the Portuguese Government in 2008 will be well underway, the Portuguese National Laboratory for Civil Engineering (LNEC) will be hosting the 6th Conference of the series on the 15 to 17th February, 2011.

On behalf of LNEC, I am most pleased to invite you to attend the 6th International Dam Engineering Conference.

The Conference will be a forum for dissemination and discussion of the latest advances in the broad area of Dam Engineering, please refer to the Conference Themes page to check for the main themes to be addressed during the Conference. You are also welcome to propose a Thematic Session.

Previously to the Conference, on the 14th of February, 2011, two special One-Day Courses will be held at LNEC and I strongly encourage your participation on this pre-conference event.

Therefore I am looking forward to welcoming all colleagues and their accompanying guests from all over the world in Lisbon in February 2011.

Conference Themes

MAIN THEMES

T1 - Concrete and Masonry Dams
T2 - Embankment Dams
T3 - Appurtenant Works
T4 - Tailing Dams
T5 - Environmental Issues
T6 - Finance and Economic Aspects

TOPICS

ST1 - Roller Compacted Concrete Dams
ST2 - Concrete Face Rockfill Dams
ST3 - Methods of Analysis and Design of Dams
ST4 - Dam Foundation
ST5 - Seismic Analysis
ST6 - Stability of Dams and Slopes
ST7 - Dam Monitoring and Instrumentation
ST8 - Safety Assessment
ST9 - Operation and Maintenance
ST10 - Rehabilitation and Dam Heightening
ST11 - Concrete Swelling Processes
ST12 - Risk Assessment
ST13 - Warning Systems
ST14 - Geomembranes for dams
ST15 - Dam Management Systems
ST16 - Design Innovation
ST17 - Modelling and Testing
ST18 - New Materials for Dams
ST19 - Small Dams
ST20 - Joint/Interface Problems at Concrete Dams
ST21 - Sedimentation in Reservoirs and Related Problems
ST22 - Decommissioning of Dams

One-Day Courses

Course 1

Date: 14th February 2011
Venue: LNEC, Lisbon, Portugal
Concrete dams subjected to alkali aggregate reactions (AAR): diagnosis, modeling and rehabilitation

Course 2

Date: 14th February 2011
Venue: LNEC, Lisbon, Portugal
Risk analysis in embankment dams. Geotechnical component

Contacts

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Piling & Deep Foundations Europe 2011, 22 - 23 February, 2011, Warsaw, Poland www.pilingfoundationeurope.com

International Conference on Tunnelling and Trenchless Technology, 1-3 March 2011, Kuala Lumpur (Malaysia), www.iem.org.my/external/tunnel/index.htm



14th Australasian Tunnelling Conference 2011
Development of Underground Space
8 – 10 March 2011, Sky City, Auckland, New Zealand

www.atstunnellingconference2011.com

Tunnelling methods and equipment have undergone a quiet revolution during the first decade of the 21st Century. Tunnel boring machines of ever larger diameters, covering the full spectrum of soil and rock conditions, are appearing. In the mined tunnel arena, computer guided equipment including road headers and drilling and bolting machines are available as is robotic sprayed concrete equipment. All of the foregoing lead to increased productivity and reduced tunnelling costs. In the design offices, numerical modelling software has permitted improved predictions of soil and structure interaction, whilst computational fluid dynamics (CFD) software has facilitated assessment of a wide range of fire and ventilation scenarios for transportation tunnels. Simultaneously, the project procurement practices have continued to evolve.

The conference theme "Development in Underground Space" encompasses these advances through keynote addresses each day and well varied session topics. Many recent case studies are also covered, providing insight into recent experiences and issues successfully addressed.

Pre-conference Short Course : **Face Stability Analysis and Support in Tunnelling**, Monday 7 March 2011

Presented by Giovanni Barla this half day workshop will comprise of 6 lectures covering the following:

- Lecture 1: Full face excavation in conventional tunnelling.
- Lecture 2: Face and heading stability analysis by empirical and analytical methods.
- Lecture 3: Face and heading stability analysis by numerical methods.
- Lecture 4: Full face excavation of large size tunnels in heterogeneous rock mass near the ground surface.
- Lecture 5: Full face excavation and reinforcement coupled with yield control systems to cope with squeezing conditions.
- Lecture 6: Case studies of TBM tunnels with face stability problems.

For further information about papers please contact:
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Geo-Frontiers 2011 - Advances in Geotechnical Engineering, 13-16 March, Dallas, Texas, USA, www.geofrontiers11.com

HydroVision RUSSIA, 28 – 30 March 2011, Moscow, Russia, www.hydrovision-russia.com

1st Scientific Symposium on Tunnels and Underground Structures in South-East Europe, 7, 8 & 9 April 2011, Dubrovnik, Croatia, www.itasee2011.com

International Conference on Vulnerability and Risk Analysis and Management (ICVRAM) and ISUMA 2011 Fifth International Symposium on Uncertainty Modeling and Analysis, April 11-13, 2011 in Hyattsville, Maryland, USA, www.asce.org/instfound/cdrm/icvram



**13th International Conference of the
International Association for Computer
Methods and Advances in Geomechanics**
9-11 May 2011 Melbourne, Australia
iacmag2011.com

The first conference in this series was held at Waterways Experiment Station, Vicksburg (USA) in 1972, and the subsequent ones were held in USA (VPI & SU), Blacksburg (USA) 1976, Aachen (Germany) 1979, Edmonton (Canada) 1982, Nagoya (Japan) 1985, Innsbruck (Austria) 1988, Cairns (Australia) 1991, Morgantown (USA) 1994, Wuhan (China) 1997, Tucson (USA) 2001, Torino (Italy) 2005 and the 12th International Conference on Computer Methods and Advances in Geomechanics was held in Goa (India) in 2008. Details of these conferences are available at www.iacmag.org/index1.html.

The 13th IACMAG Conference to be held in Melbourne, Australia during May, 2011 will address recent developments and relevant issues in computer methods, constitutive models and applications to different areas of Geomechanics, emerging and important topics, and future needs, documented case studies with integration of theory, laboratory and field tests, and validation procedures. This will be consistent with the continuing theme of IACMAG conferences and the International Journal of Geomechanics, namely Fundamentals through Applications.

The special theme for the 13th International Conference has been chosen as Geomechanics in the Emerging Social, Environmental & Technological Age. The conference will endeavour to stress on problems raised by the present day society due to rapid industrialization and globalization, in addition to the objectives covered by the previous conferences. The conference aims to focus on some very recent and emerging trends in Geomechanics such as mechanics

of unsaturated soils, micromechanics, nanomechanics, bio-geo interface, infrastructure Geomechanics and Geomechanics for ancient monuments.

Conference Topics

- Computational Advances in Numerical and Analytical Methods, Direct and Inverse problems, Practical Applications
- Constitutive Modeling for Soils and Rocks, and Interfaces and Joints
- Microcracking, Fracture, Localization, Failure
- Coupled Phenomena, Hydro-Thermo-Chemo-Mechanical Response of Geomaterials
- Testing and Modeling: Laboratory and Field Testing, Physical Modeling, Geotechnical Centrifuge Modeling
- Artificial Intelligence Techniques/Methods: Neural Networks, Expert Systems, Reliability, Data-mining, Case-based Reasoning, Risk Analysis, Genetic Algorithms
- Computers and Information Technology: Real-time Instrumentation and Monitoring, Risk Assessment and Management
- Unsaturated soils and mechanics of multi-phase multiporous media
- Rock mechanics, constitutive modelling and applications
- Emerging Geomechanics: Carbon sequestration, Multiphysics & Multi-scale, Micromechanics, Nanomechanics, Bio-Geo Interface: Molecular mechanics and Molecular Interactions in clays
- Geoenvironmental Engineering: Waste Disposal, Containment, Isolation, Alternative Covers, Remediation, Recycled Materials, Mining issues
- Flow and Contaminant Transport in Porous Media: Seepage, Contaminant Transport, Fractured Media
- Earthquake Engineering and Soil Dynamics: Wave Propagation, Liquefaction, Blast Loading, Dynamic Soil-Structure Interaction
- Geo-Hazard Mitigation: Earthquakes, Hurricanes, Typhoons, Cyclones, Landslides, Tsunamis
- Foundation Engineering: Shallow and Deep Foundations, Offshore and Petroleum Geomechanics
- Soil Improvement: Staged Construction, Preloading, Dynamic Deep Compaction, Shallow and Deep Soil Mixing, Soil Additives, Reinforcement, Geosynthetics, Prefabricated Vertical Drains, Vacuum consolidation
- Geotechnical Structures: Retaining Structures, Finite and infinite Slopes, Dams, Levees, Pipes, Caverns, Mines, Tunnels, Bore-well stability, Sustainable Construction, Quality control
- Infrastructure Geomechanics: Transportation Geotechnology, Airports, Canals, Pavements, Ports and Harbors, Railroads
- Slope Stability: Natural Slopes, Deep Seated Gravitational Movements, Landslides, Rock Avalanches, Rock Falls, Flows and Glacier Mechanics
- Case Histories: Prediction, Performance and Evaluation, Forensic Studies, Back Analysis: Pre-failure and Failure
- Geomechanics for Ancient Monuments, Preservation and Rehabilitation
- Geotechnical Education and Professional Practice

Emails: info@iacmag2011.com (general inquiries)
technical@iacmag2011.com (to submit abstracts)



7th International Symposium on "Geotechnical Aspects of Underground Construction in Soft Ground", 16-18 May 2011, Roma, Italy, www.tc28-roma.org

GEDMAR2011 Geotechnical and Highway Engineering - Practical Applications – Challenges and Opportunities at the Future 3rd International Conference on Geotechnical Engineering for Disaster Mitigation and Rehabilitation 2011 combined with 5th International Conference on Geotechnical and Highway Engineering 17 - 20 May 2011, Semarang, Central Java, Indonesia, reliability.geoengineer.org/GEDMAR2011

WTC2011 Helsinki, AITES-ITA 2011 World Tunnel Congress and 37th General Assembly, 21-25 May 2011, Helsinki, Finland, www.wtc11.org

The 14th Asian Regional Conference on Soil Mechanics and Geotechnical Engineering Hong Kong, China, 23 - 28 May 2011 www.cse.polyu.edu.hk/14arc

COMPDYN 2011 – 3rd International Conference on Computational Methods in Structural Dynamics and Earthquake Engineering, 26-28 May 2011, Corfu, Greece, www.compdyn2011.org

Dams and Reservoirs under Changing Challenges, June 1 - 2, 2011, Lucerne, Switzerland, www.swissdams.ch

5^ο Διεθνές Συνέδριο Ασφαλικών Μιγμάτων και Οδοστρωμάτων, Θεσσαλονίκη, 1-3 Ιουνίου 2011, <http://iconfbmp.civil.auth.gr>

3rd International Symposium on Geotechnical Safety and Risk (ISGSR2011), Munich, Germany, 2 ÷ 3 June 2011 www.isgsr2011.de

Short course on Reliability Analysis and Design in Geotechnical Engineering, June 1st 2011, Munich, Germany, G.Braeu@bv.tum.de

XV African Regional Conference on Soil Mechanics and Geotechnical Engineering, Maputo, Mozambique, 13 - 16 June 2011, www.15arcsmgc-maputo2011.com.



2011 RETC
Rapid Excavation & Tunneling Conference & Exhibit
June 19-22, 2011, San Francisco, California, USA

RETC is an international forum for the exchange and dissemination of developments and advances in underground construction.

ORGANIZED BY: RETC Exhibits
8307 Shaffer Pkwy
Littleton, CO 80127
303-948-4213

Fax: 303-948-3461
gury@smenet.org



GEORISK 2011 Risk Assessment and Management in Geoengineering, June 26 – 28, 2011, Atlanta, USA, <http://content.asce.org/conferences/GeoRisk2011>

IGSH 2011 Fourth International Geotechnical Symposium Geotechnical Engineering for Disaster Prevention & Reduction, 26 - 28 July 2011, Khabarovsk, Russia, www.igsh4.ru

IS – SEOUL 2011 Fifth International Symposium on Deformation Characteristics of Geomaterials, Wednesday-Friday, Aug. 31 – Sep. 3, 2011, Seoul, Korea, www.isseoul2011.org

6th International Symposium on Sprayed Concrete, 12-15 September 2011, Tromsø, Norway, www.sprayedconcrete.no

XV European Conference on Soil Mechanics and Geotechnical Engineering, 12 – 15 September 2011, Athens, Greece, www.athens2011ecsmge.org

XV European Conference on Soil Mechanics & Geotechnical Engineering, Athens, September 12-15, 2011, Workshop on Education with the theme "Case histories in Geotechnical Instruction: Appropriate cases for each educational level", September 14, Wednesday pm. Organized by ERTC 16, Local host: Dr. Marina Pantazidou, mpanta@central.ntua.gr and manoliu@mail.utcb.ro



International Symposium on Rock Slope Stability in Open Pit Mining and Civil Engineering
www.slopestability2011.ca

Slope Stability 2011, the International Symposium on Rock Slope Stability in Open Pit Mining and Civil Engineering, will be held **September 18-21, 2011 in Vancouver, Canada**. This specialty meeting will explore recent innovation and key developments in the design, analysis, excavation and management of rock slopes. Slope Stability 2011 will provide a forum for mine owners and operators, consultants, engineers, suppliers and researchers to exchange views on how to promote best practices in slope stability investigations, design, monitoring and management.

Vancouver is a key centre for the open pit mining industry, with numerous mining and consulting companies calling it home. It is also a vibrant, multi-cultural city with breathtaking views of coastal mountains from sea to sky. We hope to welcome you to Vancouver in September 2011 to discuss the challenges we are facing in our profession and the innovative solutions being developed in response to these challenges.

Technical Themes

Case studies together with papers featuring innovative analysis techniques and solutions, as well as research (recent and/or future trends), are strongly encouraged.

Topics to be considered include:

- Assessment and implications of uncertainty
- Ground water and in-situ stress
- Monitoring and managing slope movements
- Numerical analysis and design methods
- Open pit-underground mining interactions
- Pit closure and decommissioning
- Remote sensing applications
- Rock mass characterization for large rock slopes
- Rockfalls - analysis and control
- Slope design and acceptance criteria
- Slope design in arctic conditions and extreme climates
- Slope excavation, blasting techniques and quality control
- Slope failure mechanisms
- Slope performance, optimization and risk
- Support, drainage and stabilisation of slopes

For further information contact one of the following individuals:

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24th World Road Congress "Mobility, Sustainability and Development", 26 – 30 September 2011, Mexico City, Mexico,
www.piarcmexico2011.org

XIV Panamerican Conference on Soil Mechanics and Geotechnical Engineering (October) & V PanAmerican Conference on Learning and Teaching of Geotechnical Engineering & 64th Canadian Geotechnical Conference, Toronto, Ontario, Canada, 2 - 6 October 2011, www.panam-cgc2011.ca

The Second World Landslide Forum, "Putting Science into Practice", 3 – 9 October 2011, FAO Headquarters, Rome,
www.wlf2.org

Landslides and Geo-Environment, Geotechnical Symposium in Balkan Region, October 2011, Tirana, Albania, fa-tos.cenalia@gmail.com, erjon.bukaci@gmail.com

2011 AFTES Congress "Espaces Souterrains de Demain", Lyon, France, 17 – 19 October 2011,
www.aftes.asso.fr/congres_presentation-organisation.html

Beijing 2011, 12th International Congress on Rock Mechanics, 18 – 21 October 2011, Beijing, China,
www.isrm2011.com



**XI INTERNATIONAL CONFERENCE
UNDERGROUND INFRASTRUCTURE OF URBAN AREAS**
26-27 October 2011 Wrocław – Poland
www.uiua2011.pwr.wroc.pl

The aim of conference is to create a forum in order to develop an exchange of experiences and provoke a discussion on the topics related to building of tunnels and underground infrastructure in the cities. The issues such as geotechnical tests and town planning could also be brought up in this forum.

Organized by:
Institute of Civil Engineering - Wrocław University of Technology
PSTB - Polish Society for Trenchless Technology
POLISH GROUP ITA-AITES

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with the postscript: Underground Infrastructure 2011



ICAGE 2011 International Conference on Advances in Geotechnical Engineering, 7th - 9th November, 2011 - Perth, Australia, <http://www.icage2011.com.au>

AP-UNSAT 2011 5th Asia-Pacific Conference on Unsaturated Soils, 14 - 16 November 2011, Pattaya, Thailand
www.unsat.eng.ku.ac.th

4th International Conference on Grouting and Deep Mixing, February 15-18, 2012, New Orleans, Louisiana, USA,
www.grout2012.org

GEOAMERICAS 2012 II Pan-American Congress on Geosynthetics, Lima, Perú, 6 - 9 May 2012
www.igsperu.org



WTC2012 **Thailand** Underground B A N G K O K & Tunnelling Group

ITA-AITES WTC 2012
**"Tunnelling and Underground Space
for a global Society"**
Bangkok, Thailand, 18 to 23 May, 2012
www.wtc2012.com

WTC2012 Bangkok will highlight the fact that underground space utilization is important not only for particular nations or groups or businesses, but also for the decision makers in the region to realize the benefits of using underground space and importance of developing the global tunnelling and underground society.

The congress will allow professionals in the Asia region and around the world to exchange the views on current issues and future trends of Tunnelling and underground structures.

Participants of member nations of the International Tunneling and Underground Space Association (ITA-AITES) and Engineering Institute of Thailand (EIT) will be offered a great opportunity to meet with practitioners and scientists in the Tunnelling and associated industries.

Thailand Underground & Tunnelling Group (TUTG)
487 Ramkhamhang 39 (Soi Wat Thap-leela),
Wangthonglang, Bangkok,
10310 THAILAND
Email: info@wtc2012.com



Fifth International Symposium on Contaminated Sediments:
Restoration of Aquatic Environment, May 23 - 25 2012,
Montreal, QC, Canada,
www.astm.org/SYMPOSIA/filtrexx40.cgi?+-P+EVENT_ID+1857+/usr6/htdocs/astm.org/SYMPOSIA/callforpapers.frm

EUROCK 2012 - ISRM European Regional Symposium -
Rock Engineering and Technology, 27 - 30 May 2012,
Stockholm, Sweden, eva.friedman@svebefo.se

12th Baltic Sea Geotechnical Conference "Infrastructure in
the Baltic Sea Region", Rostock, Germany, 31 May - 2
June, 2012, www.12bsgc.de



11th International Symposium on Landslides 3 + 8 June 2012, Banff, Alta, Canada

The ISL/NASL 2012 Technical Committee invites authors from industry, government and academia to submit abstracts pertaining to the investigation, classification, monitoring, analysis and mitigation of landslides. Case studies together with papers featuring innovative analysis techniques and solutions, as well as research (recent and/or future trends), are strongly encouraged.

The symposium theme *Landslides and Engineered Slopes: Protecting Society through Improved Understanding* was selected because we believe that the profession is undergoing a revolution, as unprecedented amounts of quantitative data become available through new measurement and analysis techniques. Therefore, perhaps it is time to stress understanding of landslide mechanisms and behaviour. How do we make sense of all the numbers that are now available to us?

Several session themes are proposed that authors are being asked to consider when submitting their abstracts:

1. Landslides and Society: Processes and Impacts
2. Understanding Landslide Mechanisms
3. Advances in Investigation, Characterization and Modelling Tools for Hazard Assessment
4. Application of New Monitoring Technologies for Improved Landslide Hazard Management
5. Evaluation and Control of Landslides: Avoidance, Prevention and Protection Strategies

In addition, several **"Key Issues"** sessions will be developed to highlight initiatives of the JTC-1 as well as fundamental and strategic challenges being faced by landslide professionals. These include:

6. Classification of Landslides: Strategies and Requirements
7. Managing, Understanding and Using Complex Data Sets arising from New Technologies
8. Slope Stability in Forest Management
9. Impacts of Climate Change on Landslide Risk
10. Sub-Marine Landslides: Impacts, Assessment and Control

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**11th Australia-New Zealand
Conference on Geomechanics
Melbourne, Australia, 15-18 July 2012**
www.anz2012.com.au

Invitation To Attend

We are pleased to announce that the ANZ2012 "Ground Engineering in a Changing World" will be held at Melbourne's Crown Promenade Hotel in July 2012.

Information on Sponsorship, Abstract and Paper Submission, Invited Speakers, Social Events and Conference Program will be published on this website as the details confirm.

If you have any questions relating to the conference please do not hesitate to contact Paula Leishman from Leishman Associates (Conference Managers) on 03 6234 7844 or via e-mail: nicole@leishman-associates.com.au

On behalf of the ANZ2012 Organising Committee, we look forward to welcoming you to Melbourne.



**34th International Geological Congress
5 + 15 August 2012, Brisbane, Australia**
<http://www.ga.gov.au/igc2012>

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EUROGEO5 - 5th European Geosynthetics Conference, 16 - 19 September 2012, Valencia, Spain, www.eurogeo5.org



**13th World Conference of the
Associated Research Centers for the Urban
Underground Space
Development
- Opportunities and Challenges
7 - 9 November 2012, Singapore**
www.acuus2012.com

Worldwide, the use of underground space has been increasingly recognized as part of the solution to creating sustainable urban development. In Singapore, underground space has been elevated to a strategic level when the government announced that underground space development will form part of the economic strategies for Singapore's future development.

The theme for **ACUUS 2012 Singapore** is **"Underground Space Development - Opportunities and Challenges."** This theme was chosen to emphasize the unprecedented opportunities for simultaneously improving urban infrastructure and urban livability while at the same time recognizing the special challenges faced in creating underground spaces - both from a human design perspective and in terms of technical and cost challenges. Equally important is the need to move from the creation of underground facilities as a haphazard, first-come first served network of structures to a well-planned use of underground space that can serve the needs of urban areas for future generations as well as our own.

The conference will cover the following main topics:

- Master planning
- Architectural design for liveable underground space
- Safety, health, and the environment
- Legal framework and government policies
- Reasons for going underground
- Cost-benefit-analysis
- Socio-economic issues
- Site investigation and geo-planning
- Geotechnical and rock engineering
- Innovations and technology advancement
- Research and support
- Underground transport systems
- Deep caverns and mined space
- Earth-sheltered buildings and pedestrian networks
- Industrial and commercial applications
- Underground space as a strategic resource
- Utilisation of underground space and case studies
- Special projects

For any enquiries on *ACUUS 2012 Singapore*, please contact Secretariat:

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GEOSYNTHETICS ASIA 2012 (GA2012) 5th Asian Regional Conference on Geosynthetics, Bangkok, Thailand, 10 - 14 December 2012, www.set.ait.ac.th/acsig/igs-thailand

First International Congress FedIGS, 12 - 15 November 2012, Hong Kong - China, www.fedigs.org/HongKong2012

Conference to Commemorate the Legacy of Ralph B. Peck, 7th International Conference on Case Histories in Geotechnical Engineering & Soil Dynamics and Symposium in Honor of Clyde Baker, Chicago, USA, April/May, 2013, <http://5geoegconf2010.mst.edu>

ITA-AITES WTC 2013 "Underground - the way to the future", Geneva, Switzerland, 10 to 17 May 2013, www.wtc2013.ch/congress

18th International Conference on Soil Mechanics and Geotechnical Engineering "Challenges and Innovations in Geotechnics", 1 - 5 September 2013, Paris, France www.paris2013-icsmge.org

ANDORRA 2014 14th International Winter Road Congress 2014, 4-7 February 2014, Andorra la Vella (Andorra), www.aipcrandorra2014.org

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

ΝΕΑ ΑΠΟ ΤΙΣ ΔΙΕΘΝΕΙΣ ΓΕΩΤΕΧΝΙΚΕΣ ΕΝΩΣΕΙΣ



International Society for Rock Mechanics

Practical developments from mining industry focussed research

New Scaling Technology

Removing (scaling) loose rocks hanging from the roofs and sidewalls in an underground development is essential to protect workers and equipment from rockfalls.

In normal operations scaling is carried out as part of the rockbolting process.

Newcrest Mining Ltd's gold-copper Cadia East mine in New South Wales, Australia, in conjunction with Atlas Copco, has been developing and testing a new scaling technology designed to make the process safer and more precise.

Scaling was completed by hydroscaling the roofs and walls with high pressure water. Shotcrete was then applied and bolting carried out after shotcreting. This process allows for the maximum shotcrete cure time.

The site has now introduced an Atlas Copco Scaletec LC machine. The machine has the capacity to carry out the scaling followed by the shotcreting and drilling processes.

Scaling rigs are not new technology. However, in a world first, this machine is set up with laser profiler equipment which has the ability to scan a tunnel in three dimensions. Scanning allows the machine to know where it is within the tunnel and to calculate the appropriate volumes and dimensions of the tunnel's cross-section, as well as how the rock may break when scaled.



The scanner then allows a tunnel to be classified as complying or not with the mine design without the use of surveyors.

After being assessed, the machine carries out the required scaling and dimensioning followed by shotcreting and rockbolting without the potential issues arising from the tunnel being under or over excavated.

Non Destructive Testing of Rockbolts

The GRANIT system (GROund ANchor Integrity Testing) allows rockbolts to be tested in-situ using a non-destructive, non-invasive, repeatable process for quality assurance purposes.

The original concept was jointly researched and patented world-wide by the Universities of Aberdeen and Bradford, UK. The universities were conducting an on-site investigation into the effects of blasting on rock bolt integrity. Halcrow is the licensee of the system.



The test involves sending a small impulse through the element using an electric solenoid control valve. The small impulse does not compromise bolt integrity. An accelerometer samples the return pulse at up to 200kHz. The waveform is then rapidly analysed. Non-compliant rockbolt installations are identified by their "outlier" waveform responses.

Productivity levels of up to 20 bolts per hour have been achieved and tests can be carried out by a single operator.

According to Halcrow, the tests can indicate broken and sheared bolts, corrosion, poor grouting or grout bonding and over loading. Tests can be repeated at later dates to indicate bolt performance over time.

Tony Meyers
Vice President for Australasia, ISRM

Landslide detector wins enterprise award

An early-warning device for detecting landslides has won a Loughborough University enterprise award.

The invention, developed by researchers in Loughborough's civil and building engineering department, uses real-time acoustic sensors to listen for movement in the soil.

Following work funded by the EPSRC and built in collaboration with the British Geological Survey, researchers last year conducted successful trials of the sensor and won the commercialisation category of the university's Enterprise Awards 2010.

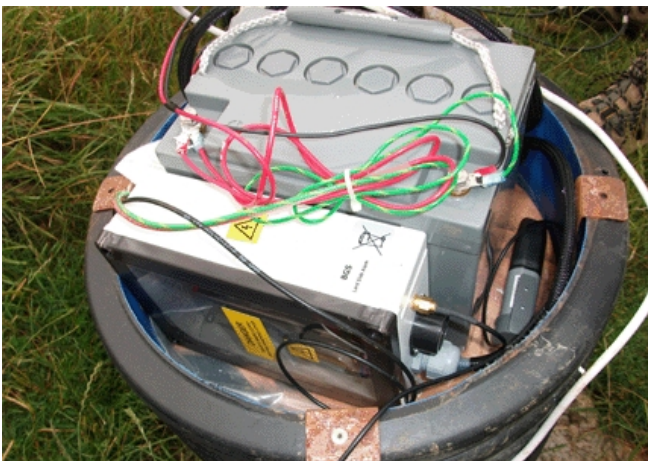
Existing monitoring systems measure the physical movement of devices planted in the ground and are checked at regular intervals to provide an indication of the average size and speed of movement.

Loughborough's device, called Assessment of Landslides using Acoustic Real-time Monitoring Systems (ALARMS), detects high-frequency stress waves produced by soil movement. Because they are continuously monitored by wireless communication, they can be used to calculate soil movement in real time.

The challenge was finding a way to detect the very small stress waves given off by soil movement, said Neil Dixon, professor of geotechnical engineering at Loughborough and co-inventor of ALARMS together with Matthew Spriggs.

'When rocks fracture they give off lots of energy as acoustic emissions,' added Dixon. 'But most landslides are in soils and you get very low energy when two soil particles move against each other and the stress wave loses energy very quickly in the ground.'

ALARMS uses a steel tube called a wave guide to conduct the signals out of the ground. This is placed in a borehole in the ground filled with sand or gravel that produces more energy when moved than the soil itself, making the signal easier to detect.



The device also detects high-frequency waves of around 20-30kHz because lower frequencies within hearing range, although they lose less energy and are easier to detect, would include background noise from other sources.

Dixon carried out tests to determine how the acoustic signal produced by the gravel related to the speed and size of movement in the ground, regardless of what kind of soil it is.

'Because we used the same backfill and wave guide every time we can actually calibrate it,' he said. 'If we get a certain amount of acoustics, we can relate that to a displacement rate.'

Measuring such high-frequency waves requires very fast computing power, so Dixon, in collaboration with the British Geological Survey, also developed a low-cost instrument to process and transmit the landslide data from the wave guide.

'It counts the number of times the signal goes above a threshold every 15 minutes and it's that number we relate to our calibrations to tell us how fast the slope is moving,' said Dixon.

'This has only been possible because of the development of printed circuit boards and the processing that can now be put on small chips. We couldn't have done this five years ago.'

Dixon has plans to conduct a second set of trials this winter on infrastructure slopes around roads and railways. He also hopes for further EPSRC funds to allow him to redesign the sensor to minimise power and cost.

(Stephen Harris / The Engineer, 14 October 2010)



Rio Tinto systems to speed mine excavations

Rio Tinto claims it could double the rate of mine excavation and improve safety with three new systems it plans to test in 2012.

The British-Australian mining group announced last week that it had finished the design and simulation of the first system – a horizontal tunnelling machine developed in partnership with engineering services provider Aker Wirth.

Some of the technology is based on that used in civil engineering to cut rather than drill tunnels, allowing continuous excavation instead of the conventional cycle of drilling, blasting with explosives and removing debris.

The new machines are part of Rio Tinto's 'Mine of the Future' programme, which also includes autonomous surface mine operations and advanced mineral recovery – improving efficiency to reduce waste and energy usage.

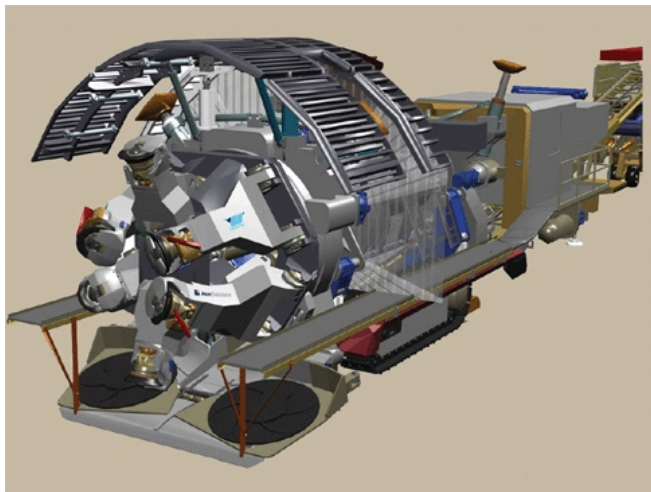
Rio Tinto's head of innovation, John McGagh, told *The Engineer* that the programme would enable faster and safer excavation of the bigger and deeper mines needed to meet mineral demand from the developing world.

'What's innovative about this is getting a system to leave you with a fully lined, operational tunnel or shaft,' he said. 'It's not just cutting or preparing the rock. These things leave you with a useable tunnel or shaft at about twice the rate you can get at the moment.'

'This machine basically peels the rock off the face. It uses multiple cutters and pretty advanced hydraulics and control systems to forward advance.'

The 64m-long horizontal machine is designed to excavate a 5.5m diameter arched tunnel at a rate of 10m to 13m depth a day. The company is now preparing for full-scale performance trials at Northparkes copper and gold mine in Australia in 2012.

The company expects to finish designs for a second horizontal machine and a vertical shaft system using similar technology by 2011. The shaft-boring machine will excavate an 11.8m diameter hole and together with the debris-removal system will be 20 to 22 storeys high.



Future mines will need to be deeper to reach enough new mineral deposits to meet demand, with copper mines expected to be in the 1,500m to 2,000m range, according to Fred Delabbio, Rio Tinto's general manager of underground mining innovation.

Conventional shaft-sinking techniques have changed little since the 1950s, he said. 'In the past this wasn't that big of an issue when you had shallow and small holes. The holes we're talking about are 10m in diameter, so you're moving more rock and it goes slower.

'By changing the way you cut, you do less damage to the rock around the shaft so you don't have to support it as much and you let the machine do the work. It elevates the skill set from doing the drilling to maintaining and operating a large tunnelling machine.'

When asked if the new system would require fewer staff to operate, he said: 'It's a misconception that to automate and mechanise you need less people. You need higher-skilled people but you have more people involved and you're going faster and safer.'

The company would not reveal the costs associated with developing the new machines, although McGagh said they were not insubstantial.

'The reason we're doing this is the value in the package is extremely substantial,' he added. 'The value comes in many ways. While the financial value is highly attractive the safety value is also another driver.'

(Stephen Harris / The Engineer, 13 October 2010)



In Studying Haiti, a New Angle on an Earthquake's Intensity

The earthquake that devastated Port-au-Prince last January may have been amplified by surface features as well as the region's underlying geology, researchers say. A rocky ridge south of the city center vibrated and shook in much the same way that a tall building behaves during a quake, amplifying and channeling the quake's force. By studying that effect, scientists hope to predict where future earthquakes are likely to have the greatest impact.

When the magnitude 7.0 earthquake struck the Haitian capital, Port-au-Prince, last January, the enormous destruction and loss of life were attributed largely to two factors: the proximity of the city to the fault that caused the shaking, and shoddy construction that allowed thousands of buildings to easily crumble.

Seismologists know that local geology can also affect the severity of an earthquake, by increasing the seismic forces under certain conditions. This was thought to have happened in the Haitian earthquake, as large areas of Port-au-Prince lie on layers of relatively soft sedimentary rock that is conducive to amplifying the seismic waves.

Now a new study finds that in addition to the underlying geology, the geometry of local surface features contributed to the earthquake's intensity as well. Susan E. Hough, a seismologist with the United States Geological Survey, and her colleagues found evidence that the shaking was amplified along a narrow ridge of hard rock south of the central city. The ridge was home to a popular hotel and other relatively well-built structures that were destroyed.

The finding, published online Sunday in the journal *Nature Geoscience*, should help scientists and planners working to map areas of the city at risk in future earthquakes, a process called microzonation.

Dr. Hough said seismologists have long known that what is referred to as topographic amplification can occur, but it has often been dismissed as "kind of a fluke thing."

"It's not something that scientists have been able to develop systematically," she said. "Sedimentary layers are what people understand."



FINDINGS : The Hotel Montana was destroyed in Haiti's quake. A study found the geometry of local surface features contributed to the quake's intensity.

There were indications from the earthquake damage that the ridge, in the suburb of Pétionville, had undergone severe shaking. Dr. Hough said that in addition to the destruction at the Hotel Montana, home to many foreign visitors, 7,000-pound battery racks at a cellphone facility farther west on the ridge shifted more than a foot.

But there was little data on local ground motion during the earthquake, which killed 230,000 people, according to official estimates. At the time, Dr. Hough said, Haiti had just one seismometer, an educational instrument that was improperly mounted. "When the earthquake happened, it went dancing around on its little feet," she said. "It did make a record, but it wasn't very useful."

So Dr. Hough, with help from scientists with the Bureau of Mines and Energy in Haiti, installed eight portable seismometers, including two on the ridge and two in an adjacent valley, and used them to measure ground movement during some of the many aftershocks that have followed the earthquake. They found that the shaking along the ridge was more severe than in the valley, so it cannot be explained by amplification in sedimentary rocks that underlie the valley.

Dr. Hough likened the shaking along the ridge to that which can occur in a skyscraper. "If you start shaking a long, skinny ridge, it sways back and forth, like a big building," she said. The seismic waves reflect internally within the wedgelike geometric structure of the ridge, combining to produce higher peak forces, a process called constructive interference.

Dominic Assimaki, a professor at Georgia Tech who reviewed Dr. Hough's paper for Nature Geoscience but was not involved in the research, said the findings should help in developing more accurate models of amplification processes during earthquakes. "Analytically the problem has been studied quite extensively, but the models are very idealized," she said.

As computer simulations become more detailed and more accurately match data from the real world, they can be used to develop guidelines for earthquake-resistant construction — how much ground movement can be expected on a ridge of a certain height or slope, for example. "The objective is to translate what we find in research into simple parameters that a designer can plug in," Dr. Assimaki said.

In Haiti specifically, Dr. Hough said, scientists developing microzonation maps can now incorporate the topographic effects seen along the ridge in their work to help the country rebuild properly and better survive the next earthquake. And future earthquakes on or near the same fault are inevitable, seismologists say. "Potentially you can say, 'You should build over here, and not there,'" she said.

Dr. Hough said that even on the ridge, with its severe shaking, some well-built and well-anchored homes and other buildings survived the earthquake practically undamaged. "It shows that you can build safely, even in zones like that," she said. "You just have to know what you're up against."

"The good news is that we can characterize the shaking," she added. "We can design for it."

(Henry Fountain / The New York Times, October 18, 2010
 στο ASCE SmartBrief, October 19, 2010)



Raise borer tries to free trapped Chilean miners

Rescue workers trying to free 33 trapped miners in the San Jose Mine near the town Copiapo in the north of Chile, have pinned their hopes on a raise borer drilling the 688m. As

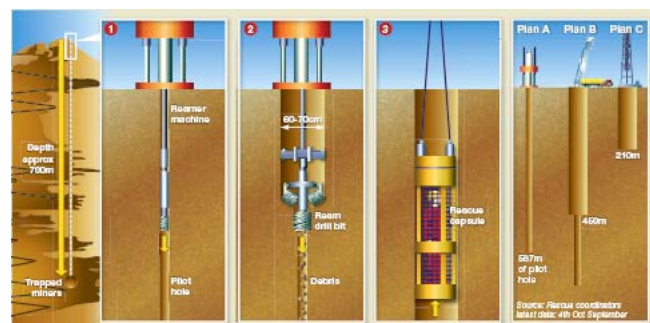
T&TI went to press, the bore rig had reached 587m on the pilot drive.

Two back-up plans are also drilling down to the miners, one using a deep exploration well driller fitted with a Down the Hole (DTH) hammer and the other using an oil probe.

The 5 August collapse of the copper mine's main access shaft happened about 400m below the surface, well above where the miners were working. A second collapse in the ventilation shaft thwarted escape efforts.

Chilean minister of mines, Laurence Golborne, ruled out a rescue through the mine's interior because of blocked ore chimneys and the high risk to rescuers. He also ruled out construction of a new tunnel because of the long delivery time. The chosen option was to drill directly to the miners. But the large depths, hard ground and need to accurately locate the miners meant Golborne opted for three simultaneous attempts, each using different technologies and locations.

The geology at the San Jose mine is mostly diorite, an igneous rock formed from cooled magma, considered to be medium-hard.



The first bore to start was the Strata 950 raise borer from South African firm Murray & Roberts Cementation. It is used to develop shafts or raises that can reach up to 8m in diameter. The operation involves drilling a pilot shaft downwards with a boring bit of about 300mm to 400mm in diameter, with a drilling speed ranging from 15m to 25m per day, depending on the rock type.

Subsequently, the shaft is slashed with a reamer. Its penetration speed will depend both on the type of rock and the final diameter of raiseboring, and normally an average of 10m to 15m of upward progress is obtained per day.

Traditional raises of upward progress have achieved over 800m in length. But it is more likely that a top-down approach will be taken and these have not been done beyond 400m, says Golborne.

Upreaming is quicker than downreaming because the reaction forces are more favourable for the borer. However, downreaming is often more manageable and is not subject to the risks that upreaming with a hybrid reamer will involve.

Murray & Roberts managing director, Henry Laas said, "rescuing the miners will be a challenging process. The mine is old and there is concern of further collapses. The rescue methodology therefore has to be carefully designed and implemented."

Rotary Vertical Drilling System (RVDS) technology, co-developed by Murray & Roberts, was applied to accurately drill a pilot hole to reach the trapped miners. After which, the hole will be opened up to 660mm or 700mm to rescue the miners. The pilot hole was due to breakthrough as T&TI went to press.

Murray & Roberts spokesman Ed Jardim told T&TI there were no foreseen problems in reaching the miners, but there are chances of delays: "Changing of the drill bits takes time, especially if more changes in bits are required than planned as a result of the hard rock. So, possible time delays."

The raise borer is expected to have the shaft ready by the end of October.

The two back up plans are making good progress. Plan B, the truck mounted deep well borer, had managed 450m of completed shaft as T&TI went to press. The Scrhramm T130 uses reverse or conventional circulation of air and it can reach 1,000m in depth.

From time to time, it's used over an existing hole, which is used as a guide, to successively enlarge the diameter of the drilling. At the San Jose mine, this will be achieved using a DTH hammer, which has five hammers in one. It has never been used in Chile before.

In the first stage, the hammer widened the diameter to 300mm and in the second round a second hammer is widening this to 700mm diameter. The average drilling speed ranges from 1m to 3m per effective hour of drilling, depending on the type of rock. So far the most bored in a day is 50m. Golborne raised initial concerns about this option as the equipment is unproven in Chile.

Plan C, the oil probe, has completed 210m of shaft. The RIG 422 is mounted on large scale crawler treads. Its tower is 45m high and it is mainly used in oil drilling. It requires a large area for its installation, some 80m by 100m.

Depth is not a concern as this rig has been used to drill more the 2,000m deep. It uses drill bits that drill into the soil in decreasing diameters; in this case it will start at 900mm and reduce to 700mm.

The drilling speed depends on the type of rock, and in the first 1,000m it can vary between 20 and 40m per day.

In early October, rescue workers reported a deviation in the drill alignment and used a back-up plan to bring it back on course. The hole diameter was reduced to 445mm to redirect the bore.

There are hopes that either plan B or plan C will reach the rescuers before the end of October.

(Jon Young / Tunnels & Tunnelling International October 2010)

Rubber-technology innovator says it will keep eyes on road

A new Las Vegas company says it plans to change the way the world paves and fixes asphalt roads.

Phoenix Materials Technologies will use rubber from ground-up tires to build safer, longer-lasting and quieter roads, Chief Executive Officer Steven Garber told the Nevada Commission on Economic Development on Tuesday.

An affiliated company at 4775 E. Cheyenne Ave. grinds used tires into rubber crumbs. Phoenix Materials uses a patented process that uses rubber crumbs to make one-half inch to seven-eighths inch dry pellets, he said.

"Our pellets don't degrade. They could last forever," Garber said.

The pellets will replace conventional asphalt that must be kept continually heated at 325 degrees, he said. Workers will heat the pellets only when they are ready to start mixing it with sand and gravel at the construction site, "almost like instant coffee."

The used tires otherwise would be dumped in landfills, Garber said, and the manufacturing process creates "zero emissions."

The process saves energy and reduces carbon dioxide emissions, which scientists say leads to global warming.

"This technology, if we're right about it, will be accepted in all jurisdictions," Garber said. He spoke about potential customers around the world.

"We're pretty confident that the market is there waiting for us to open," he said.

Garber said it can be used for patching road pot holes and for roofing as well.

"This sounds like a really cool technology," said Commissioner Anthony Dazzio, senior vice president of Burke Construction Group.

The commission voted 6-1 Tuesday to approve \$250,000 in reductions on sales, business and property taxes over 10 years. In addition, the company received a \$12,000 training grant and five-year deferral of \$48,000 in state sales taxes.

The company will employ 38 workers for an average hourly wage of \$17.21. It invested \$2.4 million in capital equipment.

Phoenix Materials Technologies occupies a part of the Las Vegas Paving facility at 9325 S. Jones Blvd. Las Vegas Paving will be the first customer, he said, predicting some local roads will be paved with the material by the year's end.

(John G. Edwards / LAS VEGAS REVIEW-JOURNAL, September 22, 2010 στο ASCE SmartBrief, September 23, 2010)



Brazil Engineers a Critic-Proof Dam

PORTO VELHO, Brazil—Tethered to scaffolding on concrete towers by a clay-colored river, workers clad head to toe for protection from sun and mosquitoes are building the first large dam in the Amazon in decades.



The Santo Antonio dam rises in the Amazon, one of 24 planned there.

Called Santo Antonio, it marks Brazil's return to dam construction in the Amazon after projects in the 1980s left a trail of disasters, including an expanse of half-submerged, methane-exuding forest three times the size of New York City.

Santo Antonio is the first step in a plan to power Brazil's rise into the ranks of the developed world through up to two dozen new hydroelectric dams that potentially will reshape giant rivers in one of the globe's most ecologically sensitive areas. On Wednesday, Brazil said that in December it will auction the rights for several new hydroelectric projects.

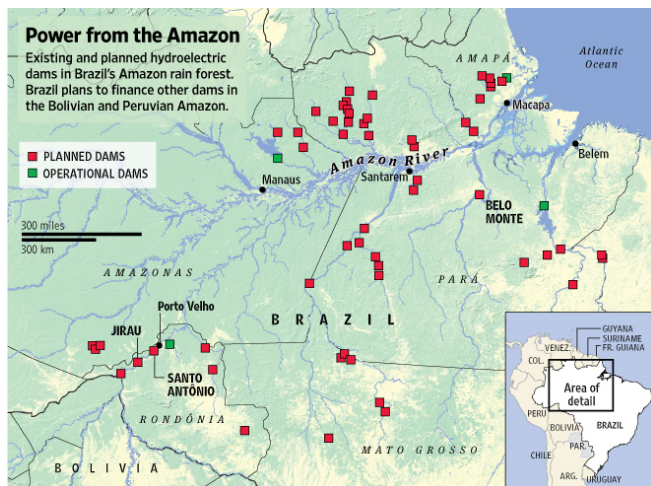
Yet few people have heard of the \$8 billion Santo Antonio project, even in Brazil—which is just how the builders planned it. They designed it to avoid the controversies that have delayed other dam projects for years and multiplied their costs.

The builders spent some \$600 million to head off trouble with regulators, environmental groups and Indian tribes before it arose. They trained thousands of rain-forest residents to provide a local labor pool and built modern houses for families who will be displaced. They created a high-tech fish ladder so species like giant catfish can get around the dam—and to meet one local demand, they built an alligator slaughterhouse.

The biggest innovation came in pushing the limits of turbine technology to reduce the area that will be flooded. Builders commissioned special turbines that don't need the water pressure of a massive lake behind them to generate electricity.

The business model also is new, at least for Brazil. Instead of the government hiring companies to simply erect a dam and hand it over to state utilities, the builders and investors pay for construction, then can sell power from the dam for decades. The deal provides incentives to hold down cost overruns and delays, the bane of old-style dam building.

So far, the strategy is working. While a different Amazon dam project has sparked a protest mounted by Hollywood filmmaker James Cameron, Santo Antonio is speeding toward completion largely out of the public eye. It is on pace to produce power a year ahead of its scheduled 2012 switch-on date.



Santo Antonio's greener look puts environmentalists in a quandary. On the one hand, it marks a big victory for them. When the first Amazon dams were built decades ago, engineers' concerns were how plant and animal life would affect the functioning of the dams, not the other way around.

But while Santo Antonio is less intrusive than past dams, in one way its footprint could prove huge. That's because the design, by providing a model for successful erection of large dams in the Amazon, makes it more likely the vast tropical rain forest will eventually see an extensive network of new dams, and a subsequent wave of industrial development.

"I understand the finer points of reducing flooding and trying to limit impacts, but my primary concern is with whether Brazil needs to be building large dams in the Amazon in the first place," says Roland Widmer, an activist with São Paulo-based environmental group *Amigos da Terra—Amazônia Brasileira*.

The dam's greener hue isn't because of any special environmental ardor on the part of the builders. It reflects a calculation about the unpredictable extra costs that environmental suits, Indian protests and political backlashes can cause.

"In the end, this is business," said Gabriel Azevedo, a former World Bank and World Wildlife Fund executive who serves as sustainability director at the energy division of the dam's lead construction company, Odebrecht SA. Odebrecht is a closely held Brazilian concern whose other projects include boring a 12-mile tunnel through the Andes to carry Amazon water to Peru. Its co-builder is another private Brazilian company, Andrade Gutierrez SA.



Seen from a distance, Santo Antonio looks like a city of concrete and scaffolds soaring along the river.

Brazil's plans call for a dam network focused on major tributaries of the giant Amazon, which won't be dammed itself. The Santo Antonio is on the Madeira, which itself is among the world's biggest rivers. Some dams will be in Peruvian and Bolivian parts of the jungle.

In all, Brazil wants to build as many as 24 dams in the Amazon this decade, at a cost of roughly \$100 billion.

In a nation that already gets over 80% of its power from dams, they are the heart of a plan to boost generating capacity 60% by 2019, for an economy growing at China-like rates.

The dams are about more than electricity: They are designed to include canals that open up previously impassable rapids to barge traffic, helping soybean farmers and loggers to get their goods to market.

Opponents say Brazil should consider alternatives such as improving existing dams before pushing into the rain forest, a species-rich region that plays a key role in the global climate equation. They say the potential impacts of Brazil's 10-year plan—including roads, mines, farms and deforestation—haven't been sufficiently studied.

Dam proponents reply that Brazil would be foolish not to tap the Amazon: Hydropower is cheaper and cleaner than things like coal, and most big rivers not yet dammed are in the rain forest. Proponents of Amazon dams include Dilma Rousseff, the leading candidate for president in a coming runoff election.

Brazil has envisioned a network of Amazon dams ever since a military regime that ruled from the 1960s to 1985 plowed roads into the jungle in a failed settlement effort. What makes dam building enticing for contractors now is the prospect of selling the electricity.

Under an arrangement refined in recent years, builders get 30-year concessions to run the dams. Building with their own money—albeit aided by subsidized financing and equity investments—they have incentives to do the job fast and efficiently. The sooner they finish, the sooner they can start selling power.

Another dam is being built under this arrangement on the same river. Contracts for two more were awarded in August. The planned December auction is to be for licenses to build as many as 3,700 megawatts of hydroelectric capacity, expected by analysts to be partly in the Amazon.

Seen from a distance, Santo Antonio looks like a city of concrete and scaffolds soaring along the river. Huge trucks look like toys next to the massive project, and on the horizon, a green canopy of jungle stretches for miles.

Work goes on round the clock, the night illuminated by white lights fixed to scaffolds and cranes. Workers pour enough concrete each month to build a 100-story building. They also consume 12,000 bottles of mosquito repellent a month.

The site was identified by José Bonifácio Pinto, an Odebrecht engineer who began scouting the vast Madeira River years ago. Counting in the site's favor were a relatively scarcity of Indian tribes, meaning fewer disputes, and the proximity of a medium-size city, Porto Velho, that could be a base for work like cement making.

A dam's biggest environmental impact comes when the area behind it is flooded, killing plants and animals and displacing people. In the Amazon this effect is magnified, as the wildlife may be rare or undocumented. And because the region is so flat, even a short dam floods a wide area.

The tall dams of the 1980s flooded vast areas with shallow swamp water. Soggy foliage produced methane, a potent greenhouse gas. Mosquitoes bred in the stagnant water, forcing locals who had lived along the river banks to flee farther into the jungle, where they sometimes fell deeper into poverty.

To reduce flooding from the Santo Antonio, the builders decided to use "bulb turbines," which make electricity from the natural flow of a river instead of requiring water under high pressure.

Existing bulb turbines were small and couldn't produce very much power. To obtain mightier ones, the builders hired two power companies, France's Alstom and the Austrian-German Voith Hydro, which developed turbines that look like chubby torpedoes 23 feet in diameter.

Using these turbines, Santo Antonio will flood around 100 square miles, much of which floods naturally every few years, instead of the 1,150 square miles or so that a traditional dam would flood.

But it will generate only a quarter of the power that a high traditional dam with a vast reservoir behind it might. So Brazil must build more dams to get the same amount of juice.

It's a trade-off Odebrecht's Mr. Pinto says isn't fully appreciated. "Brazil can only keep pace with energy demand if we build dams this way, and never really get ahead of it," he says. "But that discussion is impossible to have these days."

The dam still will displace 1,400 families. An activist group called Movement of the Dam Affected has tried to spark protests among this group, but most have fizzled.

One reason: To house the displaced, who often occupy wooden shacks, the builders are constructing riverside communities with street lights, running water and rows of identical modest homes, little Levittowns by the Madeira. Some families who don't live in the area to be flooded are trying to move in, in hopes of getting one of the homes.

Finding a work force was tricky. Porto Velho could supply only 30% of the 12,000 workers needed. That would mean an influx of thousands of outsiders, and potential social problems.

So, the builders launched a big job-training program, which so far has trained 20,000 people. Now around 80% of dam workers are locals.



Special 'bulb turbines' will limit the area flooded by the project in the ecologically sensitive region.

One is Arlincen Batista Gomes, 30 years old. A mother of seven, she was scraping by on \$110 a month as a house

cleaner when she saw an ad for the free training. Now she is a carpenter earning around \$750 monthly. "This is the first real opportunity I've had in my life to do something," she says.

The builders have also provided schools and health centers. Medical technicians on motorcycles search nearby settlements for cases of malaria. Scientists were hired to monitor silt, which can affect agriculture after a dam is built.

The Madeira is home to an estimated 400 kinds of migratory fish. The builders hired U.S. scientists to design and monitor an elaborate fish ladder.

Critics are skeptical of whether these innovations will be replicated at all of the other dams Brazil plans for the Amazon. Already, some projects that have promised the same standards have been falling short.

Upriver, French utility GDF Suez SA and Brazilian company Camargo Correa SA are building another low-impact dam. On weekends, project workers have been crowding into the sleepy nearby town of Jaci Parana, and locals say it has become a violent center of prostitution. Suez says it has a comprehensive plan to mitigate the effects of its project and has taken steps to improve the situation.

Concerns also are rising that some of the innovations at Santo Antonio could be rolled back in a government headed by Ms. Rousseff, who on the campaign trail speaks less of environmental protection than of the Amazon as a resource that Brazil must tap.

Recently, state-owned utilities have grabbed a bigger stake in some recent projects. An example is the Belo Monte dam, the one Mr. Cameron is protesting.

The project has faced local opposition plus questions from company executives and Brazilian dam engineers about whether the project will churn out enough electricity to be profitable. The government capped the price of electricity from the project. Major dam builders and operators, including Odebrecht, Suez and Camargo Correa, declined to bid on it. But Government officials are pushing ahead with the project anyway.

(John Lyons / The Wall Street Journal, October 6, 2010 στο ASCE SmartBrief, October 7, 2010)



Toronto hopes for big benefits from soil recycling

To anyone else it just looks like a pile of mud, but to David DuBois, P.Eng., executive director of geo-environmental services with Waterfront Toronto, it has a story. Just by looking at the pile, he says, he knows the soil is contaminated. It is lumpy and black, and certainly ugly. A few hundred yards away, beside one of the two pilot soil recycling plants that are operating south of Lakeshore Boulevard, are neat stacks of sorted material. One is a pile of large boulders and worn-down blocks of concrete and brick. Another pile almost looks like coal, and another consists of clean washed pebbles that you could almost imagine on a rugged beach. This kind of salvaged material could -- if the economics are right and the environmental authorities approve -- be reused for foundations and other works in the vast new developments that are planned for the waterfront area.

As is the case with many cities in Canada, Toronto's waterfront has an industrial past -- leaving a legacy of contamination. The contamination consists mostly of three types, explains DuBois -- petrochemicals, metals, and the by-products of burning.

During the soil recycling process, the soils are graded and separated according to size using water and mechanical means. The contaminants adhere to the smaller silt and clay particles, which the machines expel at the end of the process as a thick, dark slurry. At a distance across mud-soaked yards is a large lagoon that has been specially constructed to catch run-off water from the plants and in turn return it back to operate the machinery, in a closed-loop water system.

The contaminated material, as well as any hazardous material, will be taken off site. Nonetheless, DuBois says that with the recycling technologies about 70% of in-situ soils along the waterfront could be cleaned and reused. The two pilot recycling plants are located in the sprawling Port Lands, the most southeasterly of the several parcels that make up the Waterfront Toronto revitalization project. This is the largest brownfield redevelopment in North America. The entire 800-hectare site stretches from Bathurst Street in the west to the Don River mouth in the east. The soil recycling pilot plants rumbled to life in September and are about half-way through their tests. By the end they will each have processed around 10,000 cubic metres of material, but only one will be selected for the massive job over the next decade of recycling over 2 million cubic metres of soils across the entire waterfront lands. Besides the soil grading and washing process, both pilot projects are doing supplemental studies on remediation technologies such as biological and thermal treatments.

As we walk over to one of the plants, David Kusturin, vice president of program management with Waterfront Toronto, explains that the benefits from an environmental point of view soil recycling are twofold. First it saves having to haul the material off site and it saves filling landfills. Second it means that they can reuse the recycled material in the construction sites that will be proliferating along this shoreline over the next decades. Using materials ready to hand has huge environmental savings in fewer truck trips and less need to quarry for materials.

Waterfront Toronto held a request for proposals from different soil treatment companies last year, and selected two for the pilot. One of the two plants is owned and operated by DEC, a Belgian company that has partnered with local consultants Coffey Geotechnics. This system was used to clean up lands for the 2012 Olympics in London, U.K. The other plant is operated by Tetra Tech Construction Canada with a Dutch-owned company Stuyvesant Environmental Contracting.

Environ of Mississauga is overseeing the project on behalf of Waterfront Toronto.

The pilot project will help Waterfront Toronto to identify the different options for treating the soil, and to weigh up their costs and their various benefits. Success also depends, of course, on making sure that the soils can be cleaned up to the Ministry of Environment standards.

(Canadian Consulting Engineer, October 18)

St. Louis roads paved with smog-eating concrete

Road workers in St. Louis are repaving roads with smog-eating concrete as part of a \$55 million stimulus-funded improvement project.

The concrete contains an active ingredient that captures pollution and U.V. light from the sun breaks it down into harmless chemicals. MODOT officials say tests in Italy show there's been a 40 percent reduction in pollution. They also say St. Louis is the first place in the country to use the "smog eating concrete."

(KTVI-TV (St. Louis), October 27, 2010 στο ASCE SmartBrief, October 28, 2010)

Smog is a big problem in big cities. Rather than prevent smog by going all electro, another solution would be to clean it. Sounds simple enough, right? Dutch researchers from the Technical University Eindhoven have made a large step towards this approach, by developing **smog-eating concrete**. Smog (air pollution caused by combustion engines (cars) and industry) is mainly caused by the nitrogen oxides emitted by man-made machines.

The concrete these Dutch researches have created is coated with titanium dioxide, stuff that's already being used in paint for it's 'self-cleaning' properties (dirt does not attach to it). It has the additional property being 'photocatalytic'; converting nitrogen oxides into nitrate using sunlight. Nitrate is easily 'cleaned' by rain as it's soluble in water.

The concrete these researchers developed has actually already shown promising results in real world tests. The potential applications of the stuff are broad: it could be mixed with asphalt for roads, used for pavements in tiles and even to build walls with. That sounds like just about all you need to build a modern-day city.

Incorporating the addition of titanium dioxide to concrete's production cycle is supposedly not very complicated. Next to that, the stuff is very durable; it does not need any extra maintenance (it even cleans itself) and doesn't wear off. It is a tad more expensive, but the payback is evident. Until the electric future is upon us, this sounds like a very good way to cut back on air pollution.

(www.techthefuture.com/climate/smog-eating-cities, September 3, 2010)



Manslaughter reprieve for Cotswold Geotechnical boss

Manslaughter charges against Cotswold Geotechnical Holdings director Peter Eaton were this week dropped after a judge ruled he was too unwell to be tried.

December hearing

A hearing in December will determine whether corporate manslaughter charges against Eaton's firm will also be dropped.

Eaton was being prosecuted following the death of junior geologist and employee Alexander Wright, 27, who died in a trench collapse at Stroud, Gloucestershire in September 2008. Eaton was facing a charge of unlawful killing through gross negligence and could have faced life imprisonment if found guilty.

He could still appear in court, however, as his firm is facing corporate manslaughter charges. Last week judge Justice Field ordered that the prosecution against Eaton be permanently stayed after an application from his defence based on his poor health. The trial had already been adjourned since February because of Eaton's illness (*NCE* 4 March).

Test case

The corporate manslaughter trial is set to continue in January. It will be the first to use the Corporate Manslaughter Act 2007 and the firm is facing an unlimited fine if found guilty.

However, the firm's lawyer Pinsent Masons is pressing for the corporate manslaughter case to be dropped too.

"The issue is whether he is fit even to give evidence. And if he can't give evidence, whether the company can be fairly tried," explained Pinsent Masons partner Simon Joyston-Bechal.

"We'll be arguing about that at a hearing in December."

Lawyers have repeatedly questioned the choice of this case to test out the new corporate manslaughter law. Under previous legislation prosecutors would usually attempt to prove this by securing a manslaughter conviction against an individual within a company. Now a firm can be found guilty if "the way in which its activities are managed or organised amounts to a gross breach of a duty of care to the deceased" without the need to prosecute an individual as well.

Despite this, the Crown Prosecution Service (CPS) still decided to pursue a case against Eaton as an individual.

"Cases like this put a tremendous strain on the defendant," said Joyston-Bechal. "Under the old law, prosecutors had to try and prosecute directors to get charges to stick against the company, as you needed to identify a controlling mind. "In the new law, you might say you don't need to do that, unless prosecutors are being vindictive. You could just go after the company."

Burges Salmon partner Ann Metherall agreed. "Given that we have changed the law, should there be this complete focus on individuals?" she asked. "There will always be circumstances where individuals act negligently and it must be possible to hold them to account. But it is quite another

matter when the prosecution goes after individuals for no apparent reason," she said.

"Bizarre" choice

With new legislation having now eliminated the need to identify a controlling mind, Metherall said the Cotswold accident was a "bizarre choice" for a test case. Cotswold Geotechnical employed eight people and had a turnover of £350,000, according to its entry in the 2008 Geotechnical Services File published by *NCE's* sister magazine Ground Engineering.

"Cotswold is a tiny company, and just not the sort of company the new Act was designed to catch. It was designed for the sort of corporate organisation where there is no one individual to blame." Corporate manslaughter legislation was changed in the aftermath of the Hatfield rail disaster, which claimed four lives 10 years ago this week.

The CPS brought manslaughter charges against five engineers from rail operator Railtrack and maintenance contractor Balfour Beatty. But after an eight month trial all charges against the individuals were thrown out, along with corporate manslaughter charges against Network Rail and Balfour Beatty.

It was widely agreed that in complex cases such as Hatfield it was too difficult to find a controlling mind.

"Put in military terms, you see in this court five lieutenants accused of losing the entire war," defence barrister Jonathan

Goldberg QC told the jury at the time, "these five infantrymen are court martialled, but the civil servants, the politicians, the men with knighthoods who created the dysfunctional system go scot-free," he said.

(Mark Hansford / New Civil Engineer, 14 October 2010)

Rock-Fiber Rebar Gets First Big Test

Researchers in Northern Ireland report promising results from a demonstration project that used rods made with basalt fibers to reinforce a 22-meter-long concrete-deck section of a \$1.5-million replacement bridge in County Fermanagh. The mineral material, which resists corrosion and has twice the tensile strength of steel, is not yet accredited for structural use in the U.K.

In addition to testing the basalt-fiber-reinforced polymer (BFRP), the project is a demonstration of compressive membrane analysis in deck design, says Susan Taylor, a senior structural-engineering lecturer at Queen's University, Belfast, which secured a \$160,000 grant from the U.K. Dept. for Transport for the demonstration. The method takes into account the arching behavior within restrained slabs, which enhances load capacity beyond that predicted using conventional flexural theory, she says.

Taylor champions the deck design method to enhance sustainability by improving concrete durability and making more efficient use of materials. Although compressive membrane design analysis was accepted by U.K. regulators eight years ago, "a lot of consultants are only using [it] for assessments of [existing bridges] while using conventional methods for new designs," Taylor says.

For the demo, Taylor directed the Thompson's Bridge structural engineer, AECOM Ltd., Glasgow, to design the middle two-thirds of the bridge span using compressive membrane action and self-compacting concrete, obviating the need for vibrators. The section was built with basalt rebar, while the 5-m-long ends of the deck were conventionally reinforced and designed.

The 10.9-m-wide deck was cast in place over four longitudinal, precast-concrete, flat-bottomed U-shaped beams. The 16-centimeter-thick deck typically spans 1.6 m between the beams.

After the bridge's structural completion in August, Taylor's team tested the deck by applying a simulated wheel load up to 40 tonnes—nearly three times the European Union's maximum vehicle axle load, Taylor says.

Subcontractor Sengenja Ltd., Belfast, monitored the test by fitting strain gauges to sets of both the BFRP and the steel rebar, using fiber Bragg grating written on optical cables. The firm's founder, Simon Grattan, claims the optical cable technique is better than using more cumbersome metal wires still common in the U.K.

Taylor says the tests recorded maximum strains of the BFRP rebar as "very, very low," at 11.7% of the maximum capacity. The BFRP-reinforced deck deflected around 0.8 millimeters, which was less than half the deflection recorded on the equivalent steel-reinforced section. But because of other variables in the concrete, Taylor says she is reluctant to claim that BFRP reinforced sections demonstrated much better performance than the steel samples, beyond saying the BFRP section of deck "was behaving well under service loads and was slightly better" than steel.

Members of the team, working for the project's design-build contractor McLaughlin & Harvey Ltd., Mallusk, Northern Ireland, say they saw little difference between detailing the areas with either BFRP or steel bars. One drawback, however, is the inability to bend BFRP bars on-site. "It's got to be ordered in ... shape," says one designer.

The material is sourced from a manufacturer in Cheboksary, Chuvash Republic, Russia, which constrained the researchers' ability to make last-minute detailing changes.

BFRP has twice the tensile strength—at about 1,200 megapascals—of steel, while weighing 75% less and is more resistant to the alkali concrete environment than glass fiber, says Ben Williams, managing director of the start-up supplier MagmaTech Ltd., London, which supplied the "Rock-Bar" reinforcing rods for the project. He says the cost of BFRP rebar is similar to that of glass fiber, 30% to 40% cheaper than stainless steel and roughly three times more expensive than common steel rebar.

In construction, wall tiles fabricated with the material have been used as an alternative to stainless steel when low thermal conductivity is required, but Williams says the Thompson's Bridge project is the first significant structural use of BFRP rebar. He calls the project "a great step forward."

Williams is targeting high-corrosion-risk projects in which repairs would be difficult. In these conditions, BFRP would be less costly than stainless steel and, he claims, perform better than a glass-fiber product.

BFRP production is "very simple," Williams adds. Unlike glass, he says, "Basalt is mined, melted and extruded into fibers with no purification steps or additives."

The bridge's owner, the Northern Ireland Road Service, says it's interested in BFRP's potential to eliminate bridge corrosion; at a more mundane level, they say, it's pleasing to get most of their bridge's rebar paid for by the Queens researchers.

Using BFRP rebar in U.S. highways "will take some time," believes Mohsen Issa, professor of Structural and Materials Engineering at the University of Illinois at Chicago. His department has tested beams reinforced with the material and he is talking with various agencies about its possible use. "We are working with the industry to try using BFRP in a pilot project like a concrete slab or a bridge deck," he adds. "The industry is very excited about the BFRP rebar due to its strength and durability properties."

(Reter Reina / Engineering News-Record, September 29, 2010 στο ASCE SmartBrief, Septemebr 30, 2010)



Old concrete crushed, reused to extend life of Interstate 96 by up to 50 years

'Anytime you can reuse materials, it just makes sense'

What do you do with hundreds of thousands of tons of used freeway chunks?

If you're the Michigan Department of Transportation, you grind them up to make a new freeway.

Drivers who travel Interstate 96 near Grand Ledge and Okemos likely have seen the massive mountains of broken concrete that have grown during MDOT's six-month reconstruction of those sections of the highway.

As workers rebuild the roads, a separate full-time crew is busy crushing and chopping the old ones in what amounts to a massive highway recycling effort, said Robb Welch, assistant project manager for MDOT.



At work: This is the setup used to recycle broken concrete from the reconstruction of Interstate 96 near Grand Ledge. The concrete is crushed into small pieces, and the material is mixed with a water-cement compound and used to build the base of the new road. (Greg DeRuiter/Lansing State Journal)

"Materials are the biggest cost of a project," Welch said. "Anytime you can reuse materials, it just makes sense."

Here's how it works: Bulldozers and front-loaders dump the broken pieces into a massive machine that crushes the concrete into a coarse, sand-like material. The machine also sorts out embedded pieces of steel.

The crushed concrete material then is mixed with a water-cement compound, Welch said.

It's then trucked back out to the freeway to become the foundation for the new road. New concrete and pavement are placed on top of that foundation.

"There are trucks going in and out of here all day long," he said. "When this started, we had \$40 million in equipment out here."



Big pile: A truckload of concrete is added to the huge mountain of broken concrete from the highway reconstruction of I-96 near Grand Ledge.

The projects began in late April and are slated to be done in November.

In Ingham County, crews are rebuilding a six-mile stretch of I-96 between College and Meridian roads.

The Grand Ledge portion stretches six miles between the westbound I-69 interchange and just beyond the Grand River Road exit on I-96.

Unlike regular maintenance or repaving, the current projects are complete reconstructions. Crews have literally stripped the roads down to the dirt to start over.

With regular maintenance, the new roads should last 40 to 50 years, MDOT spokeswoman Kari Arend said.

The two projects combined cost nearly \$63 million.

The Grand Ledge portion is funded through \$40 million in federal stimulus funds from the American Recovery and Reinvestment Act of 2009.

"This is the biggest project I've ever worked on," Welch said.

But it's not MDOT's first experiment in recycling, Welch said.

"We've recycled old pavements for a number of years," he said. "But what's new with this project is the cement treatment."



On I-96: Pieces of recycled broken concrete from the reconstruction of I-96 near Grand Ledge come off a conveyor. The Grand Ledge portion is funded through \$40 million in federal stimulus funds.

Though costs savings are one reason for reusing the old materials, MDOT can't say exactly how much money is saved by recycling, Arend said.

(Louise Knott Ahern / Lansing State Journal (Mich.), October 4, 2010 στο ASCE SmartBrief on Sustainability, October 4, 2010)



Active volcano drill project to reveal caldera secrets

Volcanoes have shaped the world - and caused devastation in their wake. In Southern Europe they are a constant threat - the effects of a large eruption could destroy buildings and infrastructure; engulf and incinerate agriculture; and wipe out populations. Around Naples, the remains of Pompeii and Herculaneum are a constant, grim reminder of what the looming presence of Mount Vesuvius could do to the city.

Vesuvius isn't the only threat in the area, however. Less well known but even larger is a formation called Campi Flegrei, a 13km-wide crater that sits on top of an active magma chamber, whose name roughly translates as 'burning fields'. The last eruption in Campi Flegrei was in 1538, but for the past 40 years the ground in the area has been swelling - an ominous omen that another eruption could be imminent.



Eruption of the caldera, which is near Naples, may be imminent

The potential danger and the fact that little is known about this kind of volcano, which is known as a caldera, has led to plans to drill into Campi Flegrei to insert sensors that will allow scientists to locate the magma chamber precisely and find new data on the conditions around and inside it. But the project is proving controversial - opponents fear that the drilling could release heavy metals and other pollutants to the surface, or could trigger seismic events or another eruption.

Ask someone to draw a volcano and they're likely to sketch out the classic conical mountain with smoke and lava coming out of the top. These eruptions can be cataclysmic enough - Mount St Helens in the US in 1980, Eyjafjallajökull in Iceland this year, and, indeed, Vesuvius in 79AD all prove this. But caldera volcanoes have the potential to be even worse.

Calderas are formed when a large volcanic eruption completely empties a magma chamber. The ground above collapses, forming a ring-shaped fault line and a large, shallow depression. But if volcanic activity continues, the centre of the depression can be pushed upwards and eventually can erupt again. When this happens, the results can make other volcanoes look like firecrackers.

Campi Flegrei formed some 39,000 years ago; the explosion that led to its creation sent ash as far as Moscow. The last time a caldera of comparable size erupted was in 1816, in Indonesia. It killed more than 70,000 people - more than 11,000 as a direct result of the eruption - and sent enough ash into the atmosphere to cause a 'volcanic winter'. There was effectively no summer in the US and Europe, leading to crop failure and livestock death in much of the Northern Hemisphere.

The 'big daddy' of volcanic calderas is at Yellowstone in the US. Like Campi Flegrei it is still active and its last explosion, 640,000 years ago, sent 1,000km³ of rock and dust into the atmosphere. The resulting climate change is believed to have killed off all but a few thousand members of the human race.

The stakes, clearly, are high. 'Although very rare, such super-eruptions represent a serious threat to mankind,' said Guiseppe De Natale of the Italian Institute of Geophysics and Vulcanology (INGV), who is leading the drilling project. 'However, small to moderate eruptions represent a major risk as well, particularly in urban areas.' The area around Campi Flegrei is highly urbanised, with Naples nearby and many smaller towns and villages. Indeed, between 1982 and 1984 the ground was rising at a rate of 1m/yr, leading to the temporary evacuation of 30,000 people from the town of Pozzuoli, which lies above the centre of the caldera.

The project plans to drill at Bagnoli, an area near Naples on the eastern part of the caldera. De Natale hopes to penetrate down to 500m in a pilot phase, starting this month. Next spring, the main hole is to be drilled, reaching down to 4km. Fibre-optic sensors will be placed inside the borehole, measuring temperature and strain, and therefore giving information on seismic activity and ground deformation. These will have to withstand temperatures as high as 600°C. The team expects to hit supercritical fluids, but should come nowhere near any magma - the main chamber is believed to be 6,000-7,000km down.

'The role of deep drilling in this area is crucial,' De Natale told the European Geosciences Union General Assembly in May this year. 'It could give a fundamental, precise insight into the substructure, the geometry and character of the geothermal systems.' It could also provide insight into the composition and chemistry of the magma and how magma and water interact.

The drill site is some way away from the magma chamber because it will allow De Natale's geologists to look at the structure of the rock strata that make up the caldera. Closer to the centre of the structure the strata have collapsed and the picture would be confused. However, the relatively shallow level of the magma chamber is another factor that makes Campi Flegrei a good site for study. Extrapolating the temperature profile down the borehole will give a precise location for the magma.

Building sensors that can withstand such conditions is extremely challenging. Some of the most promising are made from silicon carbide (SiC), which has semiconducting properties similar to those of elemental silicon, but is also very resistant to many forms of radiation, including heat - while silicon-based electronics work up to 175°C, SiC continues to function above 600°C.

SiC sensors are the subject for a large EU-funded project called SCEPTRE (silicon carbide for high-power and temperature applications), aimed at developing electronic components and sensors for space applications (particularly in planetary exploration), pollution sensing and energy conversion. One sub-project is looking at developing X-ray spectroscopy sensors for use in missions to Europa and Titan. If they can withstand that, then the conditions inside a volcano should pose no problems.

Meanwhile, De Natale believes that the Campi Flegrei project could also provide insights for geothermal energy. If superheated fluids are present, he reasons, then there's the potential to install heat exchangers at depth to recover the energy and use it to power generating turbines. Could the risks of living near a caldera be balanced by the potential for cheap, green power? It's a question that Neapolitans could soon have to ask themselves.

in depth - Northern rock

Iceland, with its notoriously volcanic landscape, is also housing a deep-drilling project with the aim of investigating geothermal power. However, the Iceland Deep Drilling Project hit a snag last summer, when it unexpectedly encountered a molten magma chamber.

The project, based at Krafla, a 10km-wide caldera volcano in the north of the island, aims to drill down 4.5km into the volcano to investigate the conditions of supercritical fluids trapped in the rock. The volcano already powers a 60MW power station, which has been operating since 1977.

However, towards the end of June 2009, the drill encountered molten rock at a depth of just 2.1km. The drill was



Letting off steam: volcanoes such as Krafla in Iceland are used to produce energy

stopped and studies into the situation are continuing, with tests of the fluids at that depth and their characteristics. The most recent flow tests, in July, showed that the well is discharging 30kg/sec of dry, superheated steam, corresponding to 30MW of electric power.

Geothermal drill encounters molten magma chamber in Icelandic volcano

(Stuart Nathan / The Engineer, 4 October 2010)



Student opens door to earthquake shelter

Kingston University student Younghwa Lee has designed a novel door that could provide shelter for two people when an earthquake strikes.

Initially, Lee's door looks unremarkable but, in an emergency, it can swivel horizontally on a central pivot a little less than a metre above the ground. The bottom half of it remains on the ground, anchoring it to the floor and providing additional protection.

There is a small cabinet built into the door frame in which Younghwa has housed a wind-up torch, sachets of drinking water and medical supplies.



The student, who came to Kingston from the South Korean capital Seoul in 2009, said it should take only five seconds to convert the door into a makeshift protective capsule.

Lee said: 'Once an earthquake starts there are usually up to 15 seconds of relatively "safe" vertical vibrations before destructive horizontal vibrations start. The guidance for building occupants during an earthquake is to remain inside the building and take shelter under a strong table. My door is designed to be stronger and more stable than a table and - as it isn't a flat surface - most debris will slide off it.'

Lee believes her doors could be inexpensively incorporated into many homes in Istanbul, a city that the US Geological Survey estimates has a 70 per cent chance of being hit by

an earthquake measuring 7.6 on the Richter scale before 2030, potentially killing as many as 150,000 people.

(The Engineer, 28 September 2010)



Simulation system produces realistic movies of earthquakes

A Princeton University-led research team has developed a system that can produce realistic movies of earthquakes based on complex computer simulations.

When an earthquake takes place, data from seismograms measuring ground motion are collected by a worldwide network of more than 1,800 seismographic stations operated by members of the international Federation of Digital Seismograph Networks. The earthquake's location, depth and intensity also are determined. The Princeton system, called the ShakeMovie, will now collect these recordings automatically using the internet.

The scientists will then input the recorded data into a computer model that creates a virtual earthquake. The videos will incorporate both real data and computer simulations known as synthetic seismograms. These simulations fill the gaps between the actual ground motion recorded at specific locations in the region, providing a more complete view of the earthquake.

The animations rely on software that produces numerical simulations of seismic wave propagation in sedimentary basins. The software computes the motion of the Earth in three dimensions based on the actual earthquake recordings, as well as what is known about the subsurface structure of the region.

After the 3D simulations are computed, the software program plugs in data capturing surface motion, including displacement, velocity and acceleration, and maps it onto the topography of the region around the earthquake. The movies are then automatically published via the ShakeMovie portal.

Earthquake movies will be available for download about one-and-a-half hours after the occurrence of a quake of magnitude 5.5 or greater.

(The Engineer, 23 September 2010)



A specialist solution for motorways

Pile testing specialist Testconsult is using a new dynamic load testing system on UK motorways.

Testconsult was recently contracted to verify the load bearing capacity of working piles for the foundations of a variable message sign on the M6 motorway.

Traffic management and safety considerations were of paramount importance for the piling contractor when deciding the most appropriate test method, given that the site is on one of the busiest motorways in the UK.

Options

"The piling contractor had two options, static load testing or dynamic testing," says Testconsult pile testing department head Iwan Jones.

A static load test would have required the construction of a load frame with 40t of kentledge placed on top, and a test duration of up to 24 hours for each pile.

Extended enclosures would also have been required for a mobile crane. But this option was considered too dangerous because of the amount of time the crane would have had to be in position and the risk that a vehicle could collide with it.

Instead, dynamic testing was chosen. Testconsult's 1t Simbat midi-rig conducted each test in under half an hour, keeping traffic exposure time to a minimum. The midi-rig has been specifically designed for difficult locations and to provide sufficient punch to test piles with loads up to 1,500kN and 600mm in diameter.

The rig is transported by trailer and can get into tight spots under its own power. Track width can be reduced for narrow access and hard lifting points means the rig can be craned into position where normal access is not available.

Two hour test

"Previously it would be almost impossible to test piles along a motorway network such as the M6 without severe disruption," says Jones. "We can be in and out in a couple of hours and road closures are not necessary for us to get the rig into position.

"Proof testing of the foundations is the sensible option. Conventional load testing would be difficult, and would pose additional danger to motorway travellers.

While the midi-rig is designed for difficult access sites such as this, it can also be used to test piles on conventional sites, such as housing projects, retail developments or bridge structures.

"We are now able to carry out dynamic testing without the need for expensive free-fall cranes, transportation of drop weights or tying up client's plant. We are totally self-contained," says Jones.

Testconsult has also recently introduced a hand operated, portable SIMBAT micro-rig for testing micro piles up to 100KN dynamic test load.

(AllBusiness, Wednesday, September 22, 2010)



Γεωπάρκο Ψηλορείτη: Ένα μνημείο της φύσης!

Ένα σημαντικό πλεονέκτημα έχει η περιοχή του Ψηλορείτη, εφόσον η πολιτεία, βέβαια, αποφασίσει να στηρίξει τον εναλλακτικό τουρισμό, περνώντας από τα ευχολόγια σε πράξεις.

Το γεωπάρκο του Ψηλορείτη ένα από τα τέσσερα γεωπάρκα της Ελλάδας και ενταγμένο στο παγκόσμιο δίκτυο της UNESCO, είναι ένα μνημείο της φύσης, με ιστορία που εκτείνεται σε βάθος εκατομμυρίων χρόνων.

Αυτή τη στιγμή υφίστανται 37 γεωπάρκα στην Ευρώπη, 30 στην Ασία, ενώ το δίκτυο της Βόρειας και Νότιας Αμερικής βρίσκεται υπό διαμόρφωση.

Τι ακριβώς όμως είναι ένα γεωπάρκο; Είναι μια συγκεκριμένη έκταση περιοχή με πλούσια γεωλογική κληρονομιά, με φορέα διαχείρισης, ο οποίος αναπτύσσει δράσεις προβολής και προστασίας του περιβάλλοντος αλλά και ανάπτυξης εναλλακτικού τουρισμού.



Στην περιοχή του Ψηλορείτη βρίσκονται όλα τα πετρώματα που μπορεί κανείς να συναντήσει στην Κρήτη, σπήλαια όπως αυτό του Μελιδονίου και το Σφεντόνη στα Ζωνιανά, μικρά και μεγάλα φαράγγια και ασφαλώς διάφορες θέσεις με απολιθώματα. Τα πιο παλιά εντοπίστηκαν στο Μπαλί – κάποιοι πρωτόγονοι θαλάσσιοι οργανισμοί – και χρονολογούνται περίπου 300 εκατομμύρια χρόνια πριν. Τα πιο πρόσφατα είναι απολιθώματα Σειρηνίων, των θαλάσσιων δηλαδή αγγέλων που ζούσαν πριν από 7 εκατομμύρια χρόνια στην περιοχή της Γέργερης.

Η ΑΚΟΜΜ Αναπτυξιακή είναι ο φορέας διαχείρισης που έχει συστήσει μια επιτροπή διαχείρισης στην οποία συμμετέχουν η Δ/ση Δασών και περιβάλλοντος της Περιφέρειας Κρήτης, το Μουσείο Φυσικής Ιστορίας, το ΓΕΩΤΕΕ και η Μη Κυβερνητική Οργάνωση «Ινστιτούτο Σηπλιαολογικών Ερευνών», όπως μας εξηγεί ο αντιπρόεδρος του φορέα διαχείρισης του γεωπάρκου και υπεύθυνος στο γεωλογικό τμήμα του Μουσείου Φυσικής Ιστορίας, κ. Χαράλαμπος Φασουλάς. Πρόεδρος της επιτροπής είναι ο δήμαρχος Ανωγείων Σωκράτης Κεφαλογιάννης.

Το γεωπάρκο, αν και υπάρχει ένα διεθνές δίκτυο που το έχει υπό τη σκέπη του και άρα έχει εγγύηση ποιότητας, η ελληνική νομοθεσία δεν το προστατεύει, όπως και τα άλλα τρία, το Απολιθωμένο δάσος της Μυτιλήνης, τον Χελμό στην Πελοπόννησο και τον Βίκο – Αώο στην Ήπειρο που ήταν και το τελευταίο που εντάχθηκε στο δίκτυο κατά την ευρωπαϊκή συνάντηση των γεωπάρκων που έγινε τις προηγούμενες ημέρες, όπως σημείωσε μιλώντας στην Κρητική Επιθεώρηση ο κ. Φασουλάς.

Γίνονται βήματα προς αυτήν την κατεύθυνση πάντως, όπως τονίζει ο ίδιος, για να αποκτήσει νομική υπόσταση και να στηριχθεί από την πολιτεία, ενώ γίνεται μεταξύ των τεσσάρων ενταγμένων γεωπάρκων προσπάθεια για τη δημιουργία ενός εθνικού φόρουμ γεωπάρκων.

Κατά καιρούς διοργανώνονται δράσεις στο γεωπάρκο του Ψηλορείτη, υπάρχει το Κέντρο Πληροφόρησης στα Ανώγεια πινακίδες με πληροφορίες σε όλους του δήμους της περιοχής και στους δύο νομούς, Ρέθυμνο και Ηράκλειο.

Παράλληλα, όπως σημειώνει ο κ. Φασουλάς, υπάρχουν ήδη τέσσερα μονοπάτια και προγραμματίζεται η υλοποίηση περισσότερων, έχουν εκδοθεί πολλά σχετικά φυλλάδια και οδηγός για το γεωπάρκο και βέβαια λειτουργεί η ιστοσελίδα του γεωπάρκου στην ελληνική και την αγγλική γλώσσα, www.psiloritis-natural-park.gr

Ο Δρόμος της Μύγιας, Δοξαρό – Πτυχές Βώσακου και Φαράγγι Πλατανιών είναι οι προτεινόμενες πεζοπορικές διαδρομές, οι οποίες διαθέτουν διαμορφωμένα μονοπάτια με σήμανση και υποδομή ασφαλείας για τους οδοιπόρους. Οι διαδρομές αυτές απευθύνονται τόσο στους απλούς επισκέπτες που αναζητούν διεξόδους από την καθημερινότητα της αστικής ζωής και την επαφή με τη φύση, όσο και σε περισσότερο ειδικευμένους που επιθυμούν να γνωρίσουν από κοντά τα φυσικά και γεωλογικά μυστικά του Πάρκου.

Στις φυσιολατρικές οδικές διαδρομές περιλαμβάνονται: Ορεινός Μυλοπόταμος (R3), Νίδα – Δάσος Ρούβα (R4), Νότιος Ψηλορείτης – Αμάρι (R5).

Την ανάγκη υποστήριξης του φυσικού πάρκου για να αποτελέσει όχημα ανάπτυξης της ευρύτερης περιοχής με εναλλακτικές μορφές τουρισμού, έθεσε υπόψιν του υφυπουργού Τουρισμού, Γιώργου Νικητιάδη ο δήμαρχος Ανωγείων στην πρόσφατη επίσκεψή του στο Ρέθυμνο.

(Χαρά Βηλαρά / ΑΓΩΝΑΣ ΤΗΣ ΚΡΗΤΗΣ, 8 Οκτωβρίου 2010)



Hotel to be moved for tunnel

A 125-year-old hotel will soon be lifted from its base and moved to a temporary location to facilitate excavation work at the New Victoria Park Tunnel in Auckland, New Zealand.

The Birdcage, built in 1885 as the Rob Roy Hotel, will be jacked up, put on concrete beams and moved 40 m up Franklin Road. Upon completion of the work in about six months time, the hotel will be moved back onto its original site on top of the new tunnel.



The 125-year-old Birdcage being jacked up ahead of its 40 m move to make way for the new Victoria Park Tunnel

Compared with the Birdcage's hydraulics and teflon track, builder Andrew Swanston's 1900 relocation of the Christchurch Catholic Pro-Cathedral (below) from Barbadoes Street to Ferry Road over 100 metres away, using a skidded road, was a major feat.

The 862 square metre building weighing about 250 tonnes (stripped of its slate roof) was slid on joists laid over timber sleepers after having been lifted and lowered onto the track

using all the screw jacks that could be requisitioned in Christchurch. Skids of kauri were bolted to the underside, converting the church into what the 1903 Cyclopedia of New Zealand described as 'a kind of monster sleigh'. Lubricated with a mixture of tallow and soap and hauled by three traction engines, and with a prayer or two from Bishop Grimes, the building was moved with ease.



A PRO-CATHEDRAL IN MOTION.

(ICOMOS New Zealand News, 13 October 2010 και Tunnels & Tunnellinh International, September 2010)



A concrete retort to the glass-and-steel cliché

Next-generation, ultra-thin "superliquid" concrete is replacing the old steel-and-glass configuration for buildings and other infrastructure. Used in the O-14 residential tower in Dubai, the concrete is malleable, breathable and sustainable.

Imagine a construction material that's strong enough to carry cars, but as thin as your baby finger. Picture something with enough plasticity to allow bridges to appear like undulating wisps of smoke, and the cladding of apartment towers to resemble cloaks of lace. For too long, steel-and-glass buildings have monopolized our attention. Frankly, I've had my fill of them. It's time to dream again in concrete.

Abandon, for a moment, the old-technology, heavy, thick concrete that dominates and depresses our urban landscape: flat-slab residential towers, chunky bridges, overpasses that are badly cracked and discoloured. Consider a new brand of high-performance concrete that can make us believe again in the poetry of architecture – that might even make us fall in love with infrastructure and what should be the thrill of city-building.

New York's Reiser + Umemoto are at the vanguard of architects working in expressive concrete. The firm's recently completed O-14 residential tower in Dubai uses a superthin concrete shell that allows for light, air and views to filter through its lace-like façade, while providing the building's strength and structural integrity.

The tower, built by Dubai Contracting Company, stands 21 storeys high, without the need for columns or walls. Besides its barrier-free interiors, the building allows for a natural cooling "chimney effect" in the space, nearly a metre deep, between the lacey shell and the main building enclosure. The O-14 is sustainable and stunning. Our planet needs a whole lot more of these.

Producing a lyrical building out of concrete wasn't R + U's first impulse. The pressure to create with glass and steel

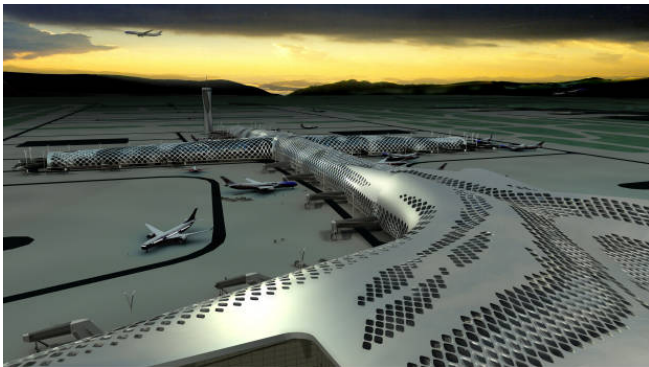
was great in Dubai, as it is in many other cities, despite the brutal desert sun and the heat sink that glass buildings naturally create.

"We encountered that in Dubai," says Jesse Reiser, who has led his highly experimental studio with partner Nanako Umemoto since 1986, and is also an associate professor of architecture at Princeton University. "Every building was a frame building with a glass-curtain wall – that's the standard – and then you put any kind of stylistic wrapper on it. Our initial schemes for O-14 were heading that way and we reached a crisis point and started working in another direction: What would work in that climate? We ended up with something that was much more sustainable."

In the end, a new-generation "superliquid" concrete was specified by the architects because it can be poured very thin, and is exceptionally malleable, while plasticizing agents make it wonderfully fluid and free of imperfections.

Unlike the rigidity of concrete-slab towers, with one floor poured in exactly the same way as the next, the O-14 allowed for a liberated, responsive form. If the client called with a request, for instance, to enlarge a corner window on a particular floor, the architects could work the new requirement into the design, then contact the engineer with the changes. The process was an iterative back-and-forth between client, architect and engineers. The punched-out aesthetic on the building's cladding looks random but, in fact, it's both logical and free-flowing.

And enchanting. Reiser + Umemoto's design for China's Shenzhen Airport – which sadly has been left on the drawing board – was a symphonic piece of concrete defined by randomized, oblique openings in its roof and walls that make steel-and-glass airports in cities from Toronto to Bangkok seem relatively ho-hum. Their long-span concrete airport – to be the first of its kind in China – would have had light entering like shafts of sunshine cutting through the canopy of a forest.



The architects had collaborated with form workers to develop a system that would have allowed them to set an ultrathin, quick-set concrete between sheets of easy-to-cut Styrofoam rather than between expensive wooden forms. The design was selected by the jury chair to win a recent international competition for the airport, but there was dissent among the jury members. The Shenzhen Airport Authority, meanwhile, preferred a proposed steel structure by Massimiliano Fuksas, competing architects from Rome. In the end, fast, predictable and problem-free prevailed. What a pity for innovation.

Still, Reiser + Umemoto are winning other important design competitions. One of those is the Taipei Music Centre in Taiwan. Scheduled to start construction this winter, it is conceived as the world's first pop-music centre with a cubic hall of fame constructed of new-generation concrete.

Among the most fascinating new brands of concrete is Ductal. Into the traditional concrete recipe – a mixture of sand,

cement and water – superplasticizers are introduced at the nano scale, allowing for a thinner, more fluid concrete. Ductal, innovated in France, was used to build the 2010 Olympic cauldron at Whistler; and, before that, to create a series of shell-like overhead canopies for the Shawnessy light-rail transit station in Calgary.

The graceful Peace Bridge in Seoul, South Korea, has a span of 130 metres, but the deck of its footbridge, constructed of Ductal, measures a mere three centimetres thick. It's like a feather floating across the Han River, giving us another reason to believe in the lightness of concrete rather than dreading the way it so often brings a city down.

(Lisa Rochon / Globe and Mail (Toronto) Oct. 15, 2010 στο ASCE Smartbrief, October 19, 2010)

ΝΕΕΣ ΕΚΔΟΣΕΙΣ ΣΤΙΣ ΓΕΩΤΕΧΝΙΚΕΣ ΕΠΙΣΤΗΜΕΣ



ΓΕΩΤΕΧΝΙΚΗ ΣΕΙΣΜΙΚΗ ΜΗΧΑΝΙΚΗ

Κυριαζής Δ. Πιτιλάκης

Το βιβλίο καλύπτει ένα σημαντικό κενό της ελληνικής επιστημονικής και τεχνικής βιβλιογραφίας στην κρίσιμη περιοχή της σεισμικής μηχανικής και του αντισεισμικού σχεδιασμού τεχνικών έργων. Απευθύνεται κυρίως στους Πολιτικούς Μηχανικούς, όπως επίσης και στους σεισμολόγους, γεωλόγους και γεωφυσικούς. Ο στόχος του είναι διττός: Φιλοδοξεί να δώσει στους μηχανικούς και τους λοιπούς επιστήμονες τις θεωρητικές βάσεις κατανόησης της φύσης του σεισμικού κραδασμού και της δυναμικής συμπεριφοράς των εδαφών, αναπτύσσοντας ταυτόχρονα τις πλέον σύγχρονες μεθόδους της σεισμικής συμπεριφοράς των εδαφών και του σεισμικού φορτίου σχεδιασμού των κατασκευών. Πρόκειται δηλαδή για ένα σύγγραμμα που απευθύνεται τόσο στον επαγγελματία μελετητή Πολιτικό Μηχανικό, όσο και στους προπτυχιακούς και μεταπτυχιακούς φοιτητές που θέλουν να ασχοληθούν περισσότερο με τη σεισμική μηχανική και τις αντισεισμικές κατασκευές. Τα θέματα που πραγματεύεται είναι τα εξής:

- Αρχές της σεισμολογίας και της τεχνικής σεισμολογίας.
- Περιγραφή της ισχυρής εδαφικής σεισμικής ταλάντωσης.
- Σεισμική επικινδυνότητα.
- Θεωρία των ελαστικών - σεισμικών κυμάτων.
- Θεωρητική και πειραματική εδαφοδυναμική.
- Δυναμική αντοχή αμμωδών και αργιλικών εδαφών.
- Ρευστοποίηση εδαφών: Θεωρία, μέθοδοι εκτίμησης και αποτροπής.
- Επιρροή των τοπικών εδαφικών συνθηκών στην ενίσχυση του σεισμικού κραδασμού: Θεωρία και μέθοδοι εκτίμησης.
- Κανονιστικές διατάξεις.
- Σχολιασμός χαρακτηριστικών παραδειγμάτων αστοχιών γεωτεχνικού τύπου σε πρόσφατους σεισμούς από την Ελλάδα και όλο τον κόσμο.

Πρόλογος

Η γεωτεχνική σεισμική μηχανική αναπτύχθηκε τις τελευταίες δεκαετίες ως ένας ιδιαίτερος κλάδος της σεισμικής μηχανικής. Το έναυσμα ήταν ένας ώριμος και ευτυχής συνδυασμός τεχνολογικής και επιστημονικής προόδου αφενός, και συστηματικών παρατηρήσεων και καταγραφών αφετέρου, από μια σειρά μεγάλων και καταστροφικών σεισμών, όπου αναδείχθηκε περίτρανα ο ρόλος των εδαφικών συνθηκών και η ιδιαίτερα πολύπλοκη συμπεριφορά του εδάφους, που σε αρκετές περιπτώσεις φόρτισης δεν μοιάζει με κανένα άλλο τεχνητό υλικό. Τέτοιοι σεισμοί ήταν οι σεισμοί στο Anchorage στην Αλάσκα και στη Niigata στην Ιαπωνία τη δεκαετία του 1960, και στην Πόλη του Μεξικού δύο δεκαετίες αργότερα, για να ακολουθήσουν πολλοί άλλοι, εξίσου ενδιαφέροντες και σημαντικοί σεισμοί για τη γεωτεχνική σεισμική μηχανική και όχι μόνο. Παράλληλα, η κατασκευή πυρηνικών αντιδραστήρων καθώς και η εκμετάλλευση και μεταφορά πετρελαϊκών κοιτασμάτων στην ανοικτή θάλασσα, ή σε ιδιαίτερα σεισμογενείς περιβάλλον, όπως είναι η Αλάσκα, σε συνδυασμό

με την εκρηκτική οικιστική ανάπτυξη σε παγκόσμια κλίμακα, και τη συνακόλουθη ανάγκη οικιστικής εκμετάλλευσης περιοχών σε σεισμογενείς περιβάλλον και μέτριες εδαφικές συνθήκες, όλα αυτά μαζί προκάλεσαν μια σημαντικότερη και αυτόνομη ανάπτυξη της γεωτεχνικής σεισμικής μηχανικής, η οποία σήμερα βρίσκεται πλέον σε ώριμη φάση. Απομένουν βέβαια ακόμη πολλά να γίνουν. Υπάρχουν πολλές εκκρεμότητες και πολλά σημαντικά αναπάντητα ερωτήματα, οπότε σίγουρα τα προσεχή χρόνια αναμένεται ακόμη μεγαλύτερη πρόοδος σε πολλούς και σημαντικούς τομείς. Το ανά χείρας βιβλίο φιλοδοξεί να καλύψει ένα σημαντικό κενό στην ελληνική βιβλιογραφία και να αποτελέσει οδηγό και αναφορά για το μέλλον, τόσο στην εκπαίδευση και την έρευνα, όσο και στην καθημερινή πρακτική κυρίως του πολιτικού μηχανικού, αλλά και του γεωλόγου, του τεχνικού σεισμολόγου και του γεωφυσικού.

Το βιβλίο καλύπτει ένα μεγάλο μέρος του αντικειμένου της γεωτεχνικής σεισμικής μηχανικής. Διαπραγματεύεται κατά κύριο λόγο τα θέματα που αφορούν την εδαφοδυναμική, την ισχυρή εδαφική κίνηση, την επιρροή των τοπικών εδαφικών συνθηκών και την εκτίμηση του σεισμού σχεδιασμού τεχνικών έργων. Επειδή όμως τα συγκεκριμένα αντικείμενα απαιτούν μια διεπιστημονική προσέγγιση, το βιβλίο ξεκινά με μια συνοπτική μεν αλλά συστηματική παρουσίαση, στα πλαίσια πάντοτε των ενδιαφερόντων του πολιτικού μηχανικού, της σεισμολογίας και της τεχνικής σεισμολογίας. Τα υπόλοιπα θέματα της γεωτεχνικής σεισμικής μηχανικής που αναφέρονται στη δυναμική αλληλεπίδραση εδάφους, θεμελιώσεων, και κατασκευών, όπως επίσης και στον αντισεισμικό σχεδιασμό θεμελιώσεων και λοιπών γεωτεχνικών έργων, θα παρουσιασθούν σε επόμενο πόνημα.

Το βιβλίο απευθύνεται σε φοιτητές των τελευταίων εξαμήνων του προπτυχιακού κύκλου σπουδών των Πολιτικών Μηχανικών, σε μεταπτυχιακούς φοιτητές πολιτικούς μηχανικούς, γεωλόγους και σεισμολόγους, και φυσικά σε επαγγελματίες πολιτικούς μηχανικούς, σεισμολόγους, γεωλόγους και γεωφυσικούς. Απαιτεί σε μικρότερο ή μεγαλύτερο βαθμό, γνώσεις εδαφομηχανικής, δυναμικής των κατασκευών και θεωρίας ελαστοδυναμικής, καθώς και σε μικρότερο βαθμό γνώσεις από άλλες ειδικότητες, όπως είναι η φυσική, η σεισμολογία, η γεωλογία, η υδραυλική και φυσικά τα μαθηματικά και η γενική μηχανική και δυναμική. Όπου κρίνεται απαραίτητο, ορισμένα από τα παραπάνω αντικείμενα αναπτύσσονται εν συντομία, κάτι που επί παραδείγματι ισχύει στο κεφάλαιο που παρουσιάζεται η θεωρία των ελαστικών κυμάτων.

Η παρουσίαση των θεμάτων που διαπραγματεύεται το βιβλίο οργανώθηκε σε επτά κεφάλαια. Στο πρώτο κεφάλαιο παρουσιάζονται και αναλύονται χαρακτηριστικές βλάβες και αστοχίες από διαφορετικούς πρόσφατους και παλαιότερους σεισμούς. Στόχος του κεφαλαίου είναι η εισαγωγή στην πολυπλοκότητα των φαινομένων που απαρτίζουν τη γεωτεχνική σεισμική μηχανική και η ανάδειξη του καθοριστικού ρόλου του εδάφους. Ερωτήματα που τίθενται στο κεφάλαιο αυτό παρουσιάζονται και αναλύονται διεξοδικά στα επόμενα κεφάλαια. Το δεύτερο κεφάλαιο είναι μια γενική εισαγωγή στη σεισμολογία και στις παραμέτρους που περιγράφουν τη γένεση των σεισμών, καθώς και τις μεθόδους και τα όργανα που μετρούν την ένταση, τη σφοδρότητα και τα χαρακτηριστικά τους. Στο τρίτο κεφάλαιο παρουσιάζονται βασικά θέματα της τεχνικής σεισμολογίας, όπως είναι η φυσική της ισχυρής εδαφικής κίνησης, τα όργανα μέτρησης της εδαφικής ταλάντωσης, τα ελαστικά φάσματα απόκρισης, οι σχέσεις εκτίμησης της εδαφικής ταλάντωσης, και γενικά όλα τα θέματα που είναι χρήσιμα στην εκτίμηση της ισχυρής εδαφικής σεισμικής κίνησης από τη σκοπιά του μηχανικού. Το τέταρτο κεφάλαιο ασχολείται με το σπουδαίο πρόβλημα της σεισμικής επικινδυνότητας και την πιθανοτική εκτίμηση του σεισμού σχεδιασμού. Όλα αυτά τα θέματα αναπτύσσονται δίνοντας συγκεκριμένα παραδείγματα και εφαρμογές από τον Ελλαδικό χώρο. Στο πέμπτο κεφάλαιο που ακολουθεί παρουσιάζονται οι βασικές αρχές της θεωρίας των ελαστικών

κυμάτων, με έμφαση στις εφαρμογές τους στην εδαφοδυναμική και τη διάδοση των σεισμικών κυμάτων στο έδαφος.

Έχοντας λοιπόν αποκτήσει τις απαραίτητες προαπαιτούμενες γνώσεις, στα επόμενα δύο κεφάλαια παρουσιάζονται τα κατεξοχήν θέματα που ενδιαφέρουν το παρόν βιβλίο, τα οποία είναι στο μεν έκτο κεφάλαιο η εδαφοδυναμική, στο δε έβδομο και τελευταίο κεφάλαιο η θεωρητική και πρακτική εκτίμηση της ισχυρής εδαφικής σεισμικής ταλάντωσης και του σεισμικού φορτίου σχεδιασμού των πάσης φύσεως κατασκευών πολιτικού μηχανικού. Το κεφάλαιο της εδαφοδυναμικής διαπραγματεύεται θέματα θεωρητικής και πειραματικής εδαφοδυναμικής, όπου αναλύονται διεξοδικά οι δυναμικές ιδιότητες των εδαφών καθώς και τα θέματα της δυναμικής αντοχής ψαθυρών και συνεκτικών εδαφών, με έμφαση στην περιγραφή και τις μεθόδους εκτίμησης της ρευστοποίησης. Τέλος, το έβδομο και τελευταίο κεφάλαιο αναφέρεται διεξοδικά στην επιρροή των τοπικών εδαφικών συνθηκών. Παρουσιάζονται οι πλέον δόκιμες θεωρητικές και πειραματικές μέθοδοι εκτίμησης της αναμενόμενης εδαφικής ενίσχυσης, δίδονται συγκεκριμένα παραδείγματα, ενώ παρουσιάζονται και αξιολογούνται οι σχετικές διατάξεις των εν ισχύ αντισεισμικών κανονισμών, συμπεριλαμβανομένων του Ευρωκώδικα 8, του ΕΑΚ 2000 και του IBC2000, που ισχύει στις ΗΠΑ. Παρουσιάζονται επίσης και προτάσεις του συγγραφέα και των συνεργατών του για τη βελτίωση των σχετικών διατάξεων του EC8 και του ΕΑΚ2000.

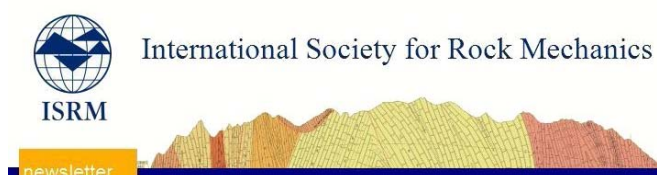
(Εκδόσεις ΖΗΤΗ, Σεπτέμβριος 2010)

ΗΛΕΚΤΡΟΝΙΚΑ ΠΕΡΙΟΔΙΚΑ



www.issmge.org

Κυκλοφόρησε το Bulletin Vol. 4, Issue 3, September 2010 της International Society for Soil Mechanics and Geotechnical Engineering.



http://www.isrm.net/adm/newsletter/ver_html.php?id_newsletter=56&ver=1

Κυκλοφόρησε το Τεύχος No. 11 – Σεπτέμβριος 2010 του Newsletter της International Society for Rock Mechanics.



www.geoengineer.org

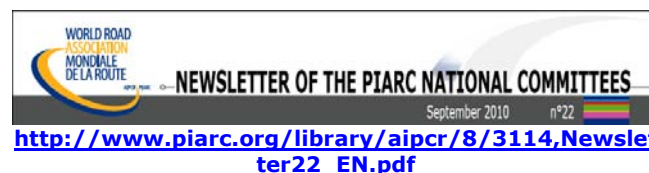
Κυκλοφόρησαν τα Τεύχη #69 και #70 του Newsletter του Geoengineer.org (Σεπτέμβριος και Οκτώβριος 2010) με πολλές χρήσιμες πληροφορίες για όλα τα θέματα της γεωτεχνικής μηχανικής. Υπενθυμίζεται ότι το Newsletter εκδίδεται από τον συνάδελφο και μέλος της ΕΕΕΕΓΜ Δημήτρη Ζέκκο (secretariat@geoengineer.org).



**INTERNATIONAL TUNNELLING AND
UNDERGROUND SPACE ASSOCIATION**
ita@news n°36

http://www.ita-aites.org/index.php?id=733&no_cache=1

Κυκλοφόρησε το Τεύχος No. 36 – Σεπτέμβριος 2010 των ita@news της International Tunnelling Association.



Κυκλοφόρησε το Τεύχος No. 37 (Οκτώβριος 2010) του Newsletter της World Road Association (PIARC) και το Τεύχος No. 22 (Σεπτέμβριος 2010) του Newsletter των PIARC National Committees.



http://foundation.itacet.org/Newsletter/04_2010/newsletter_4_2010.php

Κυκλοφόρησε το Τεύχος No. 4 (Οκτώβριος 2010) του ITACET Foundation.

ΕΕΕΕΓΜ

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