



ΜΕΤΕΩΡΑ



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& ΓΕΩΤΕΧΝΙΚΗΣ
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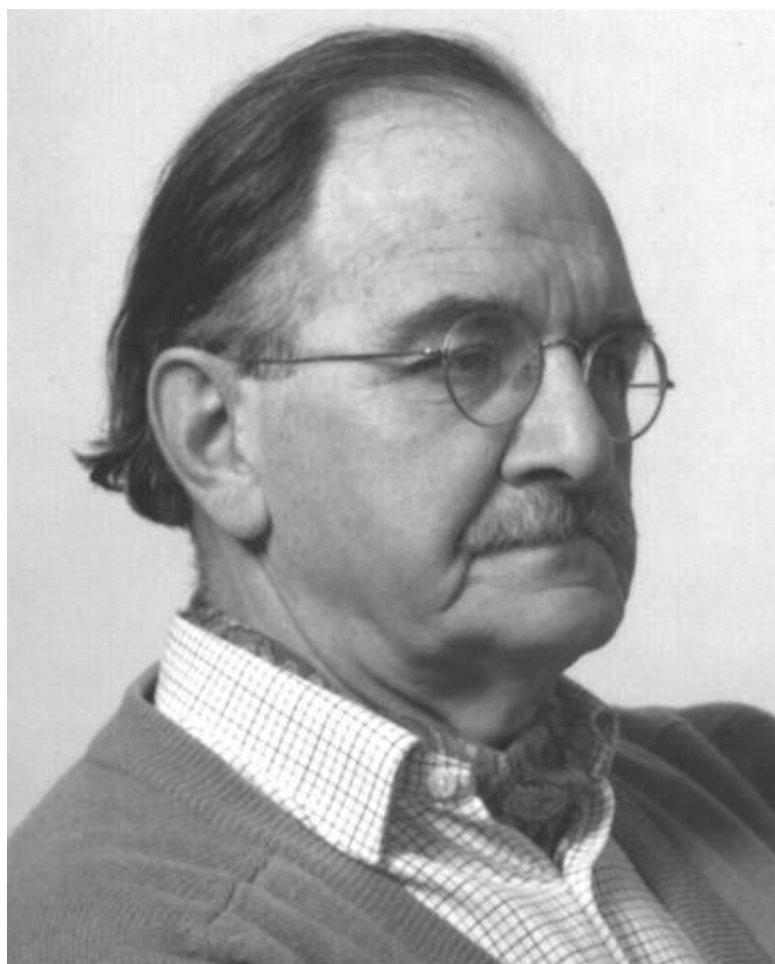
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52

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Νικόλαος Αμβράζης (1929 – 2012)

Το κακό 2012 έμελλε να τελειώσει με τον χειρότερο τρόπο για την ελληνική και διεθνή γεωτεχνική κοινότητα και την κοινότητα της αντισεισμικής μηχανικής. Την Παρασκευή 28 Δεκεμβρίου 2012 απεβίωσε, μετά από σύντομη ασθένεια, ο Νίκος Αμβράζης, ιδρυτικό μέλος της ΕΕΕΕΓΜ.

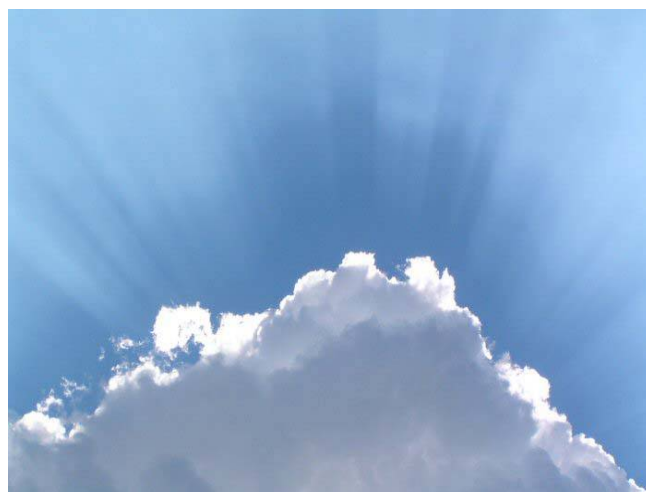


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**Ευχόμαστε πίσω από τα σύννεφα του 2012 να ανατεί-
λη ένα Νέος Έτος με Χαρά και Ευτυχία για όλους**

(συνέχεια από την σελίδα 1)

μέλος της Ακαδημίας Αθηνών, Ομότιμος Καθηγητής του Imperial College, ιδρυτής και επί σειρά ετών διευθυντής του Τμήματος Τεχνικής Σεισμολογίας του Imperial College και

Ο Νικός Αμβράζης γεννήθηκε στην Αθήνα το 1929. Έλαβε το Δίπλωμα του Αγρονόμου και Τοπογράφου Μηχανικού από το Ε.Μ.Π. το 1952 και το Diploma of Membership of Imperial College του Πανεπιστημίου του Λονδίνου στην Εδαφομηχανική το 1956. Το 1958 αναγορεύτηκε Διδάκτωρ (Ph.D.) του Πανεπιστημίου του Λονδίνου (Imperial College) και το 1980 ως Διδάκτωρ Επιστημών (D.Sc (Eng)).

Μετά την απόκτηση του Ph.D. προσελήφθη στο Τμήμα Εδαφομηχανικής του Imperial College, όπου παρέμεινε μέχρι το 1961. Το Ακαδημαϊκό Έτος 1961 – 1962 διδασκε Τεχνική Σεισμολογία στο Πανεπιστήμιο του Illinois. Το 1962 εξελέγη καθηγητής στο Ε.Μ.Π. και κατά το Ακαδημαϊκό Έτος 1962 – 1963 διδασκε Υδροδυναμική. Το 1963 επανήλθε στο Imperial και το 1968 εξελέγη ως Reader in Engineering Seismology και Καθηγητής το 1974.

Το 1968 δημιούργησε το Τμήμα Τεχνικής Σεισμολογίας στο Imperial, του οποίου διετέλεσε Διευθυντής από το 1971 έως το 1994. Το 1994 συνταξιοδοτήθηκε και διορίστηκε ως Senior Research Investigator στο Imperial, θέση στην οποία παρέμεινε μέχρι τον θάνατό του.

Είχε ασχοληθεί με τους τομείς της Τεχνικής Σεισμολογίας, της Αντισεισμικής Μηχανικής και της Γεωτεχνικής Μηχανικής και είχε επιδείξει σημαντικό έργο στην Ιστορική Σεισμολογία και ιδιαίτερα συνεισφορά στον αντισεισμικό σχεδιασμό φραγμάτων.

Ο Νικόλαος Αμβράζης ήταν συνεκδότης ή μέλος της συντακτικής επιτροπής έξι επιστημονικών τεχνικών περιοδικών, δημοσίευσε 310 εργασίες σε επιστημονικά περιοδικά και πρακτικά συνεδρίων, και έγραψε έξι βιβλία, ενώ το 2004 παρουσίασε την Rankine Lecture της British Geotechnical Society.

Διετέλεσε σύμβουλος σε θέματα Γεωτεχνικής Μηχανικής, Τεχνικής Σεισμολογίας και Αντισεισμικής Μηχανικής σε πολλές τεχνικές εταιρείες και κρατικές υπηρεσίες ανά την υφήλιο, στην Ευρωπαϊκή Επιτροπή καθώς και στα Ηνωμένα Έθνη. Από το 1963 μέχρι το 1986 ηγήθηκε περισσοτέρων των 30 αποστολών των Ηνωμένων Εθνών σε διάφορα μέρη της γης που επλήγησαν από καταστροφικούς σεισμούς. Διετέλεσε εκτελεστικός σύμβουλος Σεισμικής Περιβαλλοντικής Προστασίας του ΟΗΕ, αντιπρόεδρος της Διεθνούς Συμβουλευτικής Επιτροπής της UNESCO σε θέματα σεισμικής επικινδυνότητας, της Διεθνούς Τραπέζης για την ανακατασκευή πόλεων μετά από σεισμούς (Skopje, Managua / Nicaragua κ.α.), του ICOMOS σε θέματα σεισμικής επικινδυνότητας αρχαιολογικών μνημείων σε σεισμικές περιοχές, μεταξύ των οποίων στην Βιρμανία, το Αφγανιστάν και την Περσία, καθώς και για την αντισεισμική κατασκευή μεγάλων φραγμάτων σε Ελλάδα (Φράγμα Μόρνου), Αλγερία, Πακιστάν, Περού, Τανγκανίκα κ.α. Ακόμα, διετέλεσε σύμβουλος της Αγγλικής Υπηρεσίας Τεχνικής Ασφάλειας για την κατασκευή της σήραγγας κάτω από την Μάγχη και του Κέντρου Ερευνών του Σώματος Μηχανικών των Ηνωμένων Πολιτειών στο Vicksburg για την αντισεισμική προστασία φραγμάτων.

Τέλος, διετέλεσε επί αρκετά έτη Πρόεδρος της European Association for Earthquake Engineering και της Society for Earthquakes and Civil Engineering Dynamics του Ηνωμένου Βασιλείου.

Το έτος 2003 εξελέγη τακτικό μέλος της Ακαδημίας Αθηνών στην έδρα των Γεωλογικών Επιστημών. Ήταν εταίρος της Βασιλικής Ακαδημίας Μηχανικής του Ηνωμένου Βασιλείου και της Ευρωπαϊκής Ακαδημίας, ενώ τιμήθηκε με βραβεία από μεγάλο αριθμό επιστημονικών ενώσεων χωρών σε όλη τη γη.

Πριν από 3 περίπου χρόνια παρουσιάσαμε, στο Τεύχος 21 του Απριλίου 2009 του περιοδικού, αφιέρωμα στις τότε πρόσφατες διακρίσεις του Νικολάου Αμβράζη για την μακρόχρονη ακαδημαϊκή και ερευνητική προσφορά του:

1. Το 2006 τιμήθηκε με το Medal of the Seismological Society of America for "Outstanding Contributions in Seismology and Earthquake Engineering". Το βραβείο αυτό καθιερώθηκε αμέσως μετά τον σεισμό του San Francisco το 1906 και έχει δοθεί σε 26 επιστήμονες μέχρι σήμερα.
2. Το 2007 θεσπίστηκε από την European Association for Earthquake Engineering η Nicholas N. Ambraseys Lecture, η οποία θα δίνεται κάθε τέσσερα χρόνια κατά την διάρκεια του European Conference on Earthquake Engineering. Στα πρακτικά της συνεδρίασης της Εκτελεστικής Επιτροπής της ΕΑΕΕ, που πήρε την σχετική απόφαση, αναφέρονται:

Item 6: Secretary General proposed the establishment of EAGE Lecture to honour Prof. Nicholas N. Ambraseys of Imperial College to be presented in the future in every European Conference on Earthquake Engineering. The two main motivations for such a lecture were; (1) To award European leading researchers, to promote EAGE and (2) To honour Prof. Nicholas Ambraseys who has been a pioneer on Earthquake Engineering in Europe. Establishment of the EAGE Lecture – with a full paper from the Lecturer was approved by Executive Committee Members. Carlos Oliveira stated that four years period for the Lecture may be quite long and his preference was this Lecture to be given in every two years. This suggestion was also accepted such that after the first Lecture to be held in 14th ECEE, Skopje; the Prof. Nicholas Ambraseys Lecture can be hosted by the Universities, Institutes etc. in Europe and can be broadcasted online.

3. Το 2008, αναγορεύθηκε Επίτιμο Μέλος του Earthquake Engineering Research Institute του Πανεπιστημίου του Berkeley, California, USA, "for his distinguished career in the field of engineering seismology". Η αναγόρευση σε επίτιμο μέλος του EERI γίνεται σε μέλη «who have made sustained and outstanding contributions in the field of earthquake engineering».
4. Επίσης το 2008 ανακηρύχθηκε, κατά την διάρκεια του 14th World Conference on Earthquake Engineering στο Πεκίνο, μαζί με 12 άλλους διεθνούς φήμης επιστήμονες (ζώντες και αποθανόντες), ως Legend in Earthquake Engineering για την "exceptional and lasting contribution made to the research frontier and the professional practice of earthquake engineering".

LEGENDS OF EARTHQUAKE ENGINEERING



**NICHOLAS
AMBRASEYS**
Senior Research Fellow
Imperial College, London,
U.K.



TAKUJI KOBORI
(1920-2007)
Professor (Emeritus)
Kyoto University
Kajima Corporation



KIYOSHI MUTO
(1903-1989)
Professor (Emeritus)
University of Tokyo, Japan



THOMAS PAULAY
Professor (Emeritus)
University of Canterbury
New Zealand



RAY W. CLOUGH
Professor (Emeritus)
University of California,
Berkeley, USA



JAI KRISHNA
(1912-1999)
Formerly Vice-Chancellor
University of Roorkee
India



NATHAN M. NEWMARK
(1910-1981)
Professor (Emeritus)
University of Illinois at
Urbana-Champaign



JOSEPH PENZIEN
Professor (Emeritus)
University of California,
Berkeley, USA



H. BOLTON SEED
(1922-1989)
Professor
University of California,
Berkeley, USA



GEORGE W. HOUSNER
Professor (Emeritus)
California Institute of
Technology, USA



HUIXIAN LIU
(1912-1992)
Professor
Institute of Engineering
Mechanics, China



SHUNZO OKAMOTO
(1909-2004)
Professor (Emeritus)
University of Tokyo, Japan
Saitama University, Japan



EMILIO ROSENBLUETH
(1926-1994)
Professor (Emeritus)
National University of
Mexico

5. Τέλος, τον Σεπτέμβριο 2008 τιμήθηκε από το Imperial College για την πενήντάχρονη προσφορά του στο Κολλέγιο.

Imperial College
London

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celebrating long
service

50 years

Professor Nicholas Ambraseys, Senior Research Investigator (Civil and Environmental Engineering)

Emeritus Professor Nicholas Ambraseys started at Imperial in September 1955 as a researcher in the Department of Civil Engineering, specialising in seismology—the scientific study of earthquakes. He describes the College in the 1950s: “It was a time of little paperwork where everyone had a secretary and where we’d discuss problems in the lab over coffee at the SCR; it was a big family really.” In 1963 Dr Ambraseys spent a year working in the University of Illinois but he returned to the College as he preferred Imperial’s style of teaching. He says: “This is one of the only institutions I know which allows students to sip knowledge through a straw and really gives them time to absorb and work with what they have learnt before giving them more information.”

One of Professor Ambraseys’s favourite aspects of his job is getting to see his research used around the world. In 1967 he worked with Professor Alec Skempton to create the Mangla Dam in Pakistan—something he is particularly proud of. He went on to work with the United Nations on projects that included helping local people in Saudi Arabia to produce earthquake-resistant building designs in 1983. He sits on a number of high profile boards and was a member of the Channel Tunnel Safety Authority until 1989.

Consultancy aside, he really enjoys working as a mentor for his students. He says: “It’s great being a catalyst and working out how to help students progress. After being here for so long you begin to recognise patterns of behaviour and can use your experience of helping one student 10 years ago to help a student with a similar problem today.”

While the College has changed around him, Professor Ambraseys explains what has kept him here for a monumental 50 years: “Because I’m surrounded by friends who always give me fantastic advice.”

Η Εκτελεστική Επιτροπή της ΕΕΕΕΓΜ με βαθύτατη θλίψη πληροφορήθηκε την απώλεια του διακεκριμένου επιστήμονα, φίλου, συνεργάτου και δασκάλου πολλών μελών της ΕΕΕΕΓΜ και αποφάσισε να διοργανώσει εκδήλωση, σε συνεργασία με το Ελληνικό Τμήμα Αντισεισμικής Μηχανικής, για να τιμήσει τον Νίκο Αμβράζη και να θεσπίσει ειδικό βραβείο στη μνήμη του.

Το άρθρο αυτό αποτελεί την προσκεκλημένη διάλεξη στο XV European Conference on Soil Mechanics and Geotechnical Engineering, που διεξήχθη στην Αθήνα τον Σεπτέμβριο 2012, του συναδέλφου Ηλία Μιχάλη. Η διάλεξη αυτή παρουσιάστηκε, λόγω κωλύματος του Ηλία Μιχάλη, από τον Πρόεδρο της ΕΕΕΕΓΜ Χρήστο Τσατσάνιφο, και στο 40th Annual Conference Foundations / Zakládání staveb Brno 2012 της Czech Geotechnical Society στις 12 Νοεμβρίου 2012.

Tunnelling Projects in Greece, Challenges, Gained Experiences and Achievements

Ilias K. MICHALIS

Tunnel and Geotechnical Expert, N.T.U.A., MSc, DIC

ABSTRACT

Tunnelling in Greece has shown a remarkable development in the last 20 years and this is due to the real "cosmogony", which was occurred during the aforesaid period, in the infrastructure projects. Indeed, since the early 1990's and until even recently, a very large number of motorway and railway projects (i.e. Egnatia Motorway, Motorways Concession Projects, Athens and Thessaloniki Metros, ERGOSE railway lines, etc.), either were fully constructed or are in the stage of their completion. As a consequence, significant design and construction experiences, which are related directly to the tunnels' excavation schemes, primary support measures and different types of final lining (i.e. reinforced, lightly reinforced or unreinforced) in a wide variety of geological / geotechnical conditions were gained. The obvious merit from all these experiences, is that if they will be applied within reasonable frameworks of application, can offer significantly to the necessary tunnels designs' optimisations and to the rationalisation of the corresponding tunnels' construction costs. The future of tunnelling in Greece seems promising through new financing models (i.e. concession agreements), since one of the obvious mid-term "antidote" to the economic recession is the investment to the construction of new but necessary infrastructure projects. Some of these new projects are the extensions of Athens and Thessaloniki Metros, new urban and suburban motorways and new railway lines.

Keywords: tunnelling, metros, geological strength index, tunnel stability factor, micro-tunnelling, jet grouting, weak rock, final lining

1. RECENT HISTORICAL BACKGROUND OF TRANSPORTATION TUNNELLING IN GREECE

Since the early 1990s, numerous challenges in designing and completing successfully the construction of a significant number of large scale infrastructure projects have been faced in Greece. In these projects, tunnelling was a significant part, mostly related to real challenging engineering problems. The solutions of these problems demanded the combination of the detailed knowledge of the in-situ geological and geotechnical conditions, with the implementation of innovative design ideas and construction techniques.

The most significant infrastructure projects of the last 20 years in Greece, which either were successfully constructed, or presently are at the stage of their completion, are:

- Egnatia Motorway It is a 670 km motorway, connecting the north western coastline of Greece, at Igoumenitsa port, with the north-eastern borders with Turkey, at Alexandroupolis city (Figure 1).
- Attiki Odos. It is the modern northern peripheral motorway of the city of Athens, with a total length of 65km, serving the scope of the main connection of Attika region with the international airport Eleftherios Venizelos (Figure 2).
- Athens Metro. The metro network is presently consisting of three main fully operating lines, with a total length of 51km. Significant network's extensions are currently under construction.
- Thessaloniki Metro. The project is under construction and is comprised of one line, having a length of 9.6km, which connects the west and the east edges of the second largest city of Greece.
- Concession Highways. They are sections of already existing and new highways having 1415km of alignment's total length, with 50% of their aforesaid length constructed and in full operation.
- High speed railway axis. It consists of 500km new alignment of the main south to north railway axis Patras – Athens – Thessaloniki.



Figure 1. Egnatia Motorway axis.



Figure 2. Attiki Odos. Athens northern peripheral motorway.

Table 1 summarises all the previously mentioned infrastructure projects, by presenting the total tunnels' lengths, which correspond to each one of these projects. In conclusion, the total length of the motorway and railway tunnels, which were constructed in the last 20 years in Greece, is 347.5km. This indisputable engineering achievement classifies Greece as the fourth country (after Italy, Austria and Germany), among all the countries of the European Union, on the basis of the existing motorway tunnels having length greater than 500m [1].

Table 1. Tunnels' lengths of the recent major infrastructure projects in Greece

<i>Title of the infrastructure Project</i>	<i>Total alignment length (km)</i>	<i>Total tunnels' length (km)</i>
<i>Egnatia Motorway</i>	<i>670</i>	<i>100</i>
<i>Athens – Thessaloniki Motorway</i>	<i>515</i>	<i>35.4</i>
<i>Attiki Odos – Athens Peripheral Motorway</i>	<i>65</i>	<i>15.4</i>
<i>Elefsina – Korinthos – Patras – Pyrgos – Tsakona Motorway</i>	<i>365</i>	<i>30.2</i>
<i>Korinthos-Tripolis-Kalamata & Lefkaro – Sparti Motorway</i>	<i>205</i>	<i>4.9</i>
<i>Ioannina – Antirrio Motorway</i>	<i>159</i>	<i>6</i>
<i>Panagia – Lamia Motorway</i>	<i>174</i>	<i>20</i>
<i>Athens Metro</i>	<i>30.4</i>	<i>30.4</i>
<i>Thessaloniki Metro</i>	<i>9.5</i>	<i>9.5</i>
<i>Railway /ERGOSE projects</i>	<i>500</i>	<i>95.7</i>

2. GAINED TUNNELLING DESIGN EXPERIENCES

2.1. General

The significant number of the recent tunnelling projects in Greece created the basis on which new tunnel design methodologies were developed. These methodologies aimed to provide technically sound solutions to numerous challenging engineering problems, which were related not only to the better understanding of the adverse and complex geological and geotechnical conditions of Greece, but also to the need of controlling sufficiently and economically the inherent geotechnical risk factor, in complicated underground projects.

Such design methodologies or tools are the Geological Strength Index (GSI) [2], [3] and the Tunnel Stability Factor (TSF) [4]. The GSI is an evolving rock mass rating system, aiming to the derivation of reliable rock mass strength and deformability input parameters for the numerical analyses or closed form solutions of tunnelling problems. The TSF is an engineering index for the qualitative and quantitative assessments of tunnel stability problems, continuously being calibrated on the basis of reliable data from recorded tunnels' behaviours.

2.2. Geological Strength Index

Since 1998, Evert Hoek and Paul Marinos, dealing with incredibly difficult geo- materials, encountered in tunnelling projects in Greece, developed the GSI system, scoping to the possibility of rating geologically, even poor quality heterogeneous rock masses. Typical GSI charts (among others), which can be used for the rating purposes of rock masses are presented in Figures 3 and 4.

GSI system places greater emphasis on basic geological observations of rock mass characteristics; reflects the rock mass structure and geological history and has been developed specifically for the estimation of rock mass engineering properties, rather than for providing in direct way guidelines for tunnels' primary support measures and final lining reinforcement.

The "heart" of the GSI classification is a careful engineering geological description of the rock mass, which is essentially qualitative and combines the two fundamental parameters of the geological process: (a) the blockiness and (b) the condition of discontinuities of the mass. It is thus a geologically sound index that is estimated on the basis of available charts (Figures 3, 4), after careful visual examination of the

rock masses, exposed in natural outcrops and man-made excavations, such as road cuts and tunnel faces.

In dealing with specific rock masses, it is suggested that the selection of the appropriate case in the available GSI charts should not be limited to the visual similarity with the sketches of the structure of the rock mass, as they appear in the charts. The associated descriptions must also be read carefully, so that the most suitable structure is chosen. The most appropriate case may well lie at some intermediate point between the limited number of sketches or description included in the charts.

Excavated slope and tunnel faces are probably the most reliable source of information for GSI estimates, provided that these faces are reasonably close to and in the same rock mass as the excavation under investigation.

The assessment of GSI on the basis of the visual inspection of available borehole core samples must be made always with certain caution, since the borehole drilling techniques may affect the final recovered quality of the rock masses, guiding their rating process to unnecessary underestimations. Additionally, it is pointed out that although borehole core samples are the best source of data at depth, these one dimensional information (provided by the cores) must be always extrapolated to the three dimensional in-situ rock mass conditions. Without any doubt, the successful rating process of rock masses with the GSI system, demands sound knowledge and previous experience.

For stability analysis of a slope, the evaluation is based on the rock mass through which it is anticipated that a potential failure plane could pass. The estimation of GSI values in these cases requires considerable judgment, particularly when the failure plane can pass through several zones having shearing characteristics of different quality. It is noted that mean values may not be appropriate in the aforesaid case.

For tunnels, the index should be assessed for the volume of rock involved in carrying loads, e.g. for about one to two diameters around the tunnel periphery, in the case of tunnel behaviour or more locally in the case of a structure, such as the elephant foot of a steel arch.

Once the GSI rating system has been applied for any rock mass, the estimated range of GSI values can be used, as input data, to a set of empirically developed equations (e.g. Hoek – Brown failure criterion), which provide reasonable estimations of the compressive strength (σ_{cm}), shear strength parameters (c , ϕ) and deformability modulus (E_m) of the rock mass. The aforesaid set of parameters can be used in complex numerical analyses and closed form solutions of tunnelling problems. It has to be noted that the use of GSI values in the previously mentioned mathematical expressions, is being made in conjunction with the appropriate values for both the unconfined compressive strength of the intact rock (σ_{ci}) and the relevant petrographic constant (m_i).

Although GSI is a totally independent system, in the earlier period of its application, it was proposed that correlations of "adjusted" RMR and Q values with GSI be used for providing the necessary input data, for the Hoek – Brown criterion. Although, this process may work with the better quality rock masses, it is unreliable in the range of weak (e.g. $GSI < 35$), very weak and heterogeneous rock masses, where these correlations are not recommended [3].

The major assumption, which exists behind the successful application of GSI, is that the rock mass, to be rated, has to be characterised by a sufficient number of "randomly" oriented discontinuities, and as a consequence of this, it behaves as a homogeneous isotropic mass. Therefore, GSI should not be applied to those rock masses, in which clearly

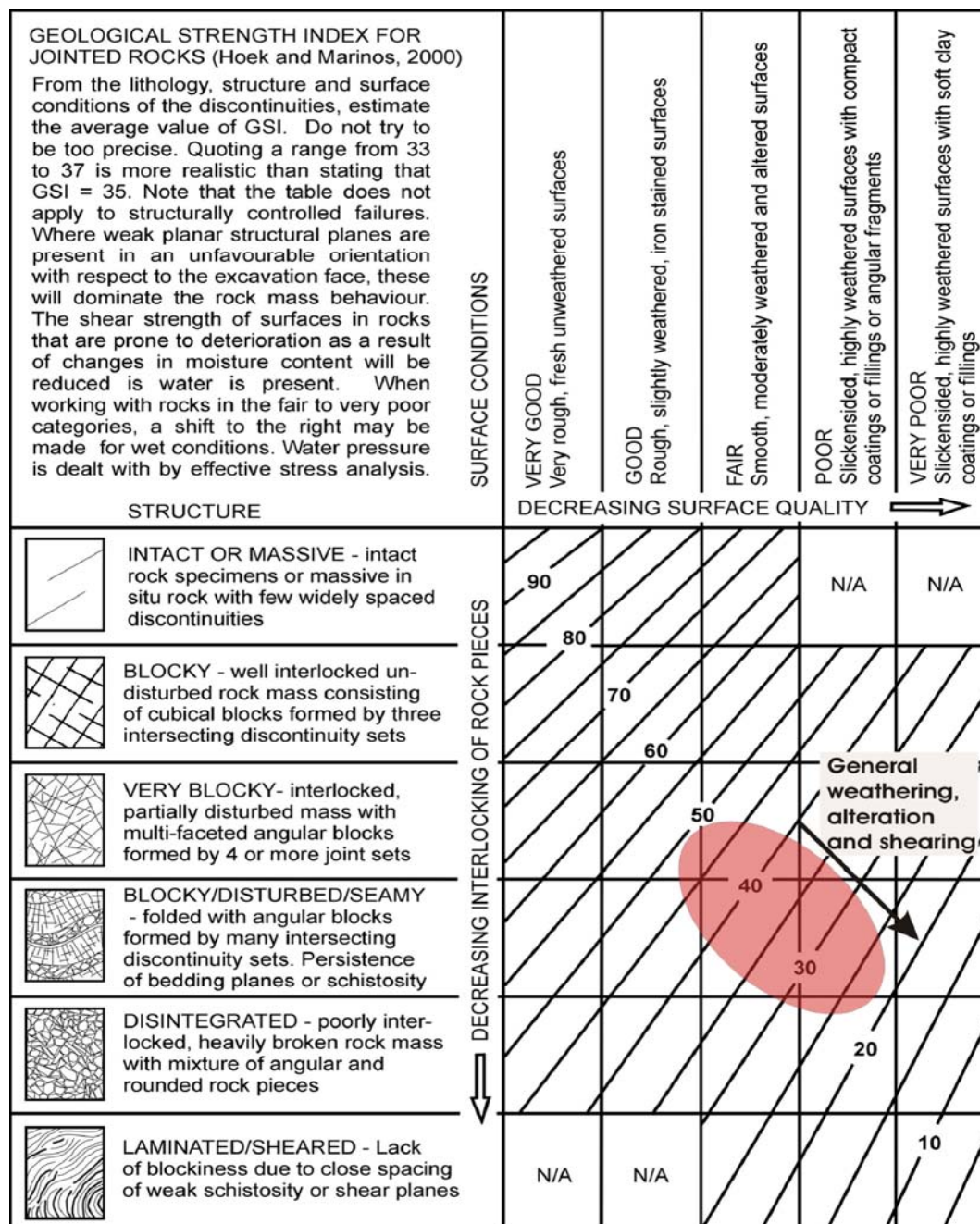


Figure3. General GSI chart for rock mass ratings based on geological observations

defined structural orientation dominates and / or the existence of structurally dependent gravitational instability mechanisms can be easily recognised.

Another limitation of GSI application is in rock masses, such as claystones, siltstones and weak sandstones, which were developed in geologically stable conditions, in a post tectonic environment, and they usually present a simple structure with no or very few discontinuities. In case that these rock masses are continuous with no discontinuities, the rock mass can be treated as intact, with its engineering parameters estimated directly by the relevant laboratory and in-situ testing results.

The influence of the groundwater in the application of GSI rating system is significant for the categories of discontinuities, covering the range between "fair" to "very poor". The downgrade of the assigned GSI values, by their appropriate shifting to the right of the appropriate chart, is considered necessary in wet conditions, since the presence of ground-

water, along the surfaces of the aforesaid type of discontinuities, may lead to further deterioration of their infilling materials.

2.2. Tunnel Stability Factor

Hoek [5] argued that the severity of the tunnels stability problems, mainly in weak rock conditions, depend upon the ratio of the value of in-situ rock mass strength, σ_{cm} , to the in-situ geostatic vertical stress level, $p_0 = \gamma H$. This argument was originally verified by the construction of two dimensionless plots (Figures 5, 6), based on the results of a Monte Carlo analysis, in which the input parameters for the rock mass strength and the tunnel deformation were varied at random in 2000 iterations. The upper and lower bounds of the used parameters in Hoek's analysis were as follows: (a) Intact rock strength, $\sigma_{ci} = 1-30\text{MPa}$, (b) Hoek-Brown constant, $m_i = 5-12$, (c) Geological Strength Index, $\text{GSI} = 10-35$, (d) In-situ hydrostatic stress $= 2-20\text{MPa}$ and (e) Tunnel radius, $r_0 = 2-8\text{m}$.

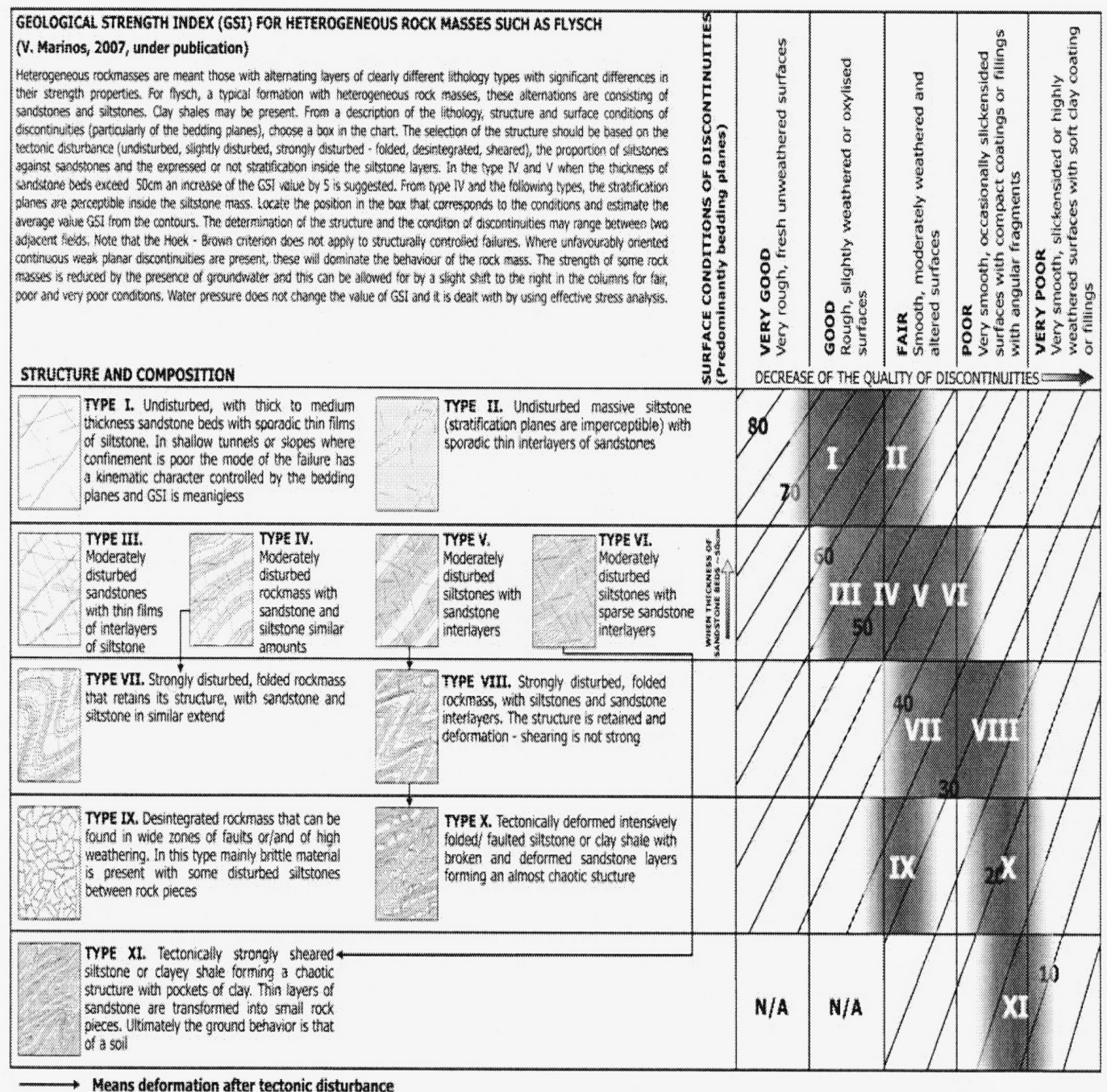


Figure 4. GSI chart for heterogeneous rock masses (such as flysch).

Figure 5 presents the plot of the ratio of plastic zone radius to tunnel radius (r_p/r_0) versus the ratio of rock-mass strength to the in-situ geostatic vertical stress (σ_{cm}/p_0). Figure 6 presents the variation of the ratio of the tunnel's periphery convergence to tunnel radius (u_i/r_0) against the ratio of rockmass strength to the in-situ geostatic vertical stress (σ_{cm}/p_0). In spite of the wide range of the examined conditions, the reasonably well-fitted curves of both diagrams can show a good indication of the average trend.

An important conclusion derived from Figures 5 and 6 is that the dimensionless quantities r_p/r_0 and u_i/r_0 , increase very rapidly, once the rock-mass strength falls below 20% of the in-situ stress. According to Hoek [5], the aforesaid limit of $\sigma_{cm}/p_0 \leq 0.20$ can be considered as one general criterion, which defines the limit between the practically stable

tunnelling conditions in sound rock masses, from the unstable ones, mainly in the weak rock masses.

Following Hoek's original idea of adopting the ratio σ_{cm}/p_0 , as the controlling parameter of the tunnels general stability conditions, Mihalis et al [4] made a further extension, by including the size of the underground openings in the derivation of a new parameter, the so-called Tunnel Stability Factor (TSF). TSF is expressed mathematically by Equation 1.

$$TSF = \frac{\sigma_{cm}}{\gamma H} D^{0.25} \quad (1)$$

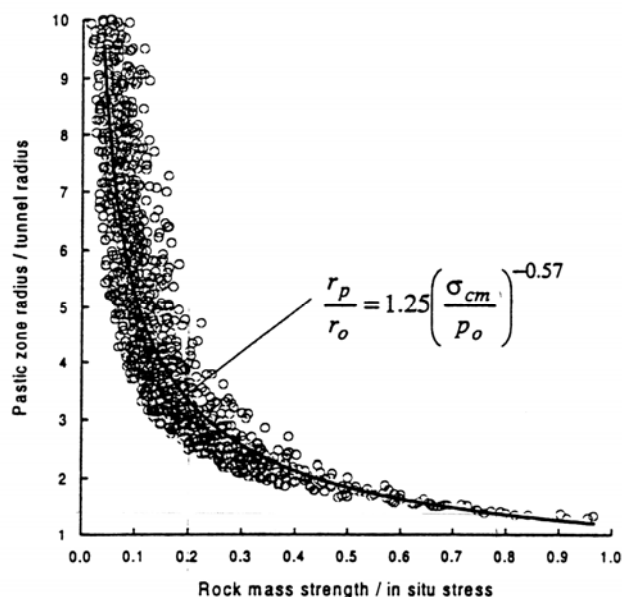


Figure 5. Relationship between size of plastic zone and ratio of rock-mass strength to in-situ stress

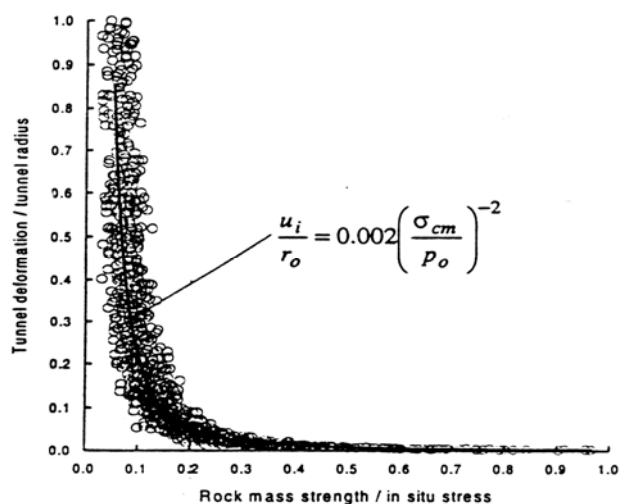


Figure 6. Tunnel deformation versus ratio of rock-mass strength to in-situ stress.

The inclusion of the size (equivalent diameter D) of the underground openings in TSF, results from the tunnelling experience, that in similar geological / geotechnical environment and at the same overburden heights, tunnels of different size, exhibit modes of deformational behavior having different scale and degree of criticality.

The role of TSF in the tunnels stability conditions was examined by numerically analyzing 74 cases, with the following lower and upper bounds of the parameters used in this parametric numerical study: (a) Intact rock strength, $\sigma_{ci}=5\text{--}50\text{MPa}$, (b) Hoek-Brown constant, $m_i=10$, (c) Geological Strength Index, $GSI=10\text{--}50$, (d) Initial geostatic stress field of gravitational type with $K_0 = 0.5 - 1.0$ and (e) Tunnel radius, $r_0=2\text{--}5\text{m}$.

The performed numerical analyses were focused on to the examination of the deformation patterns and shear failure modes of the rock mass, surrounding unsupported tunnel circular sections of different size. The factors: (i) tunnel's periphery convergence / tunnel equivalent radius and (ii) plastic zone radius / tunnel equivalent radius were derived in all the examined cases and a unifying framework was developed to account for the severity of tunnel stability problems in terms of the corresponding TSF calculated val-

ues. The governing role of the proposed factor TSF in deriving the tunnels stability conditions was verified in Figures 7 and 8, where the ratios r_p/r_0 and u_i/r_0 are plotted against the corresponding TSF values.

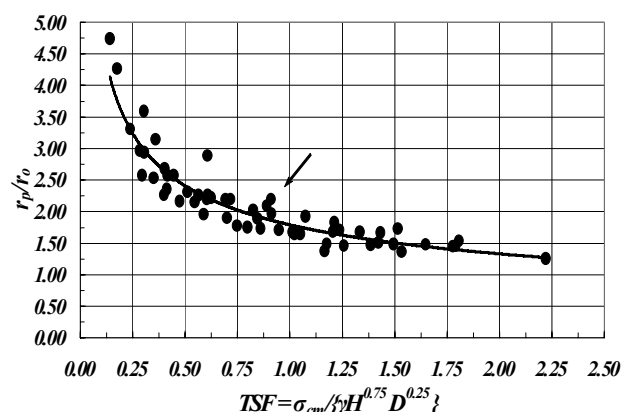


Figure 7. Ratio of plastic zone radius to equivalent tunnel radius versus TSF

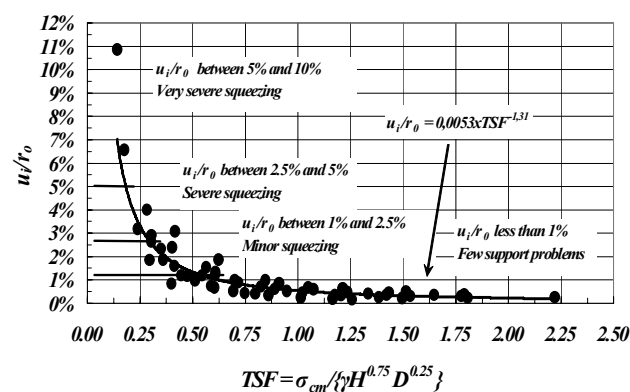


Figure 8. Ratio of tunnel's periphery convergence to equivalent tunnel radius versus TSF

It is remarkable the fact that in spite of the very wide range of conditions, included in the performed numerical analyses, the results in both figures tend to follow a very similar trend. In addition, the fitted curves are considered that can give a satisfactory indication of the average tunnel behavior, without including the effects from the installation of any primary support measures.

Figure 8 gives a set of approximate guidelines on the criticality of tunnels stability conditions, which can be encountered for different limits of the ratio u_i/r_0 . These limits can be considered that give a first estimate of tunnel squeezing problems.

It is noted that from Figure 8 the following limiting tunnel stability cases can be derived:

- For $TSF \leq 0.20$, $5\% < u_i/r_0 \leq 10\%$, very severe squeezing problems. Detailed analyses are necessary. Ground improvement techniques with partial excavations of adequately small size must be examined, in conjunction to the installation of very heavy primary support measures. Time sequence of the primary support measures and final lining is very essential.
- For $0.20 < TSF \leq 0.30$, $2.5\% < u_i/r_0 \leq 5\%$, severe squeezing problems. The installation of very heavy primary support measures is necessary on the basis of detailed analyses. Time sequence of the primary support measures is very essential.
- For $0.30 < TSF \leq 0.60$, $1\% < u_i/r_0 \leq 2.5\%$, minor squeezing problems. The installation of typical primary support

measures is considered necessary to establish adequate stability conditions.

- For $TSF > 0.60$, $u_i/r_0 \leq 1\%$, few support problems. The installation of minor primary support measures can control easily any possible instabilities.

The curves shown in Figures 7 and 8 are defined by Equations (2) and (3):

$$\frac{r_p}{r_0} = 1.79 \left(\frac{\sigma_{cm}}{\gamma H^{0.75} D^{0.25}} \right)^{-0.43} \quad (2)$$

$$\frac{u_i}{r_0} = 0.0053 \left(\frac{\sigma_{cm}}{\gamma H^{0.75} D^{0.25}} \right)^{-1.31} \quad (3)$$

3. CONSTRUCTION CHALLENGES IN TUNNELLING

3.1. General

It is well recognised that the main reason for the successful tunnelling applications in Greece was the good understanding of the existing relationship between the chosen to be applied construction techniques, which in most of the cases included advanced technological methodologies, and the encountered geotechnical conditions. More specifically, the gained experiences from a number of tunnelling construction challenges in Greece are related to useful conclusions, which describe the successful and economic application frameworks of innovative techniques, aiming to control the geotechnical risk in adverse ground conditions.

In the following paragraphs two tunnelling cases of Athens Metro [6], [7] and one tunnelling case of Egnatia Motorway [9] are presented in more detail. All of them, among numerous others, are considered that they have provided useful experiences of successful applications of innovative tunnelling construction technologies in real challenging soft ground and weak rock conditions.

3.2. Microtunnelling application for Athens Metro

A microtunneling application was attempted for the construction needs of Monastiraki underground station complex of Athens Metro.

Monastiraki is a very densely populated area at the historical centre of Athens, downhill of Acropolis ancient monument.

The general dimensions of the station are: (a) length = 180m, (b) underground cavern diameter = 16.20m. The depth of the excavations from the ground surface was 18m approximately.

Except of the underground cavern, the complete realisation of the station complex included a number of excavations, related to an access shaft, a cross - over and the stairway galleries.

The geotechnical conditions in the area of Monastiraki station were evaluated as very adverse, where highly weathered graphitic and chloritic phyllites, alternating with meta-sedimentary shales dominate. These geo - materials have usually a dark grey to green-grey color ("black Athenian schist") and are characterized by very low shear strength and deformability parameters.

The criticality of the situation became very obvious immediately after the completion of the excavations of the vertical access shaft, as the surface settlements exceeded 80mm, by creating a great deal of skepticism about the safe sup-

porting methodology to be applied in the next construction steps.

The microtunnelling, aiming to the construction of 22 steel pipes of 1.2m diameter, along the outer periphery of the main cavern, was decided as the proper method, which could create the necessary stiff crown support, prior to the continuation of the underground excavations (Figure 9). The design of the microtunnelling was made by using very sophisticated 3-D finite element software (Figure 10).

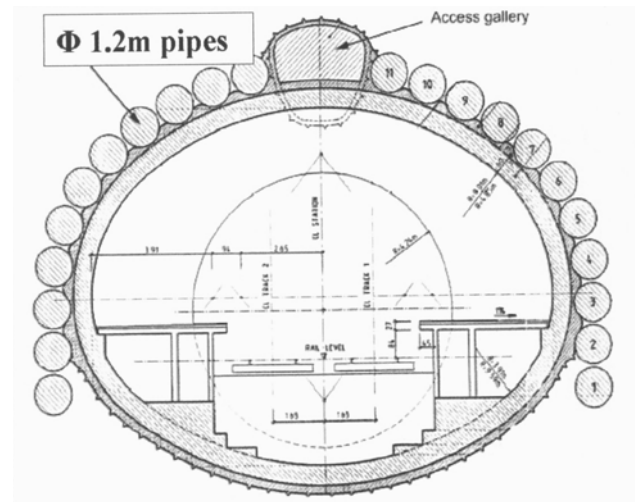


Figure 9. Microtunnelling application in Monastiraki, for the pre-support of the main station cavern.

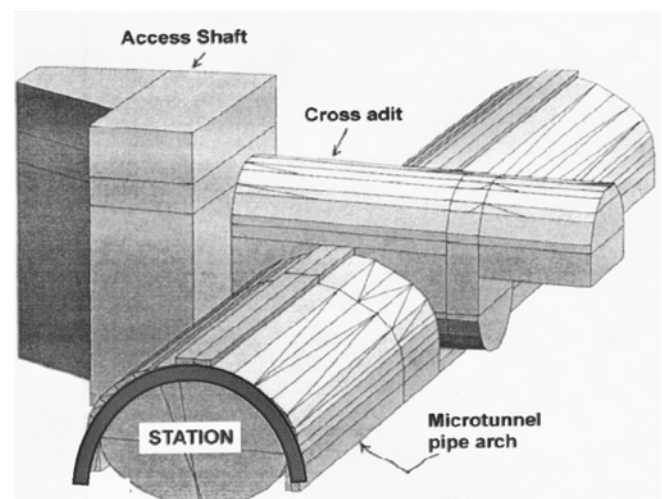


Figure 10. 3-D finite element model for the numerical simulation of the microtunnelling in Monastiraki.

The whole application was successful and the scope of controlling the ground movements, during the excavations, to acceptable serviceability limits for the existing superstructures was finally achieved.

3.3. Jet grouting application in weak rock conditions for Athens Metro

Jet grouting techniques were extensively applied in one location of the Athens Metro project with poor sub-ground conditions; the tunnel stretch along the alignment of Aghiou Konstantinou street in the historic centre of Athens. This case has been extensively presented by Mihalidis et al [7]. At this particular site, TBM was operating with an extremely poor performance, resulting to an overall advance rate less than 2.0m/day. This was due to the occurring large, occasionally uncontrolled, over-break failures (Figure 11), which caused major delays, while freeing the machine and grouting the cavities.



Figure 11. Significant over-break failure at Aghiou Konstantinou street. Athens Metro project.

The main reasons for the observed ravelling tendency of the ground strata, (above the TBM cutter head), were attributed mainly to the insufficient cohesion, along the locally existing highly weathered and intensely tectonised zones, in conjunction with the large muck openings of the TBM cutter head, which could not control the muck-flow. According to the findings of the performed geotechnical investigation, the existing ground conditions at Aghiou Konstantinou area are summarized as follows:

- The overburden layer, which varies between 2 and 6m in thickness, mainly consists of alluvial deposits and backfill materials of brownish sandy silty clay with fragments of limestone and siltstone.
- The first layer of the substratum, with thickness between 4 to 8m approximately, consists of greenish - greyish fractured weak metasiltstone with medium to high degree of weathering.
- The second layer of the substratum consists of greyish - black highly weathered, very weak phyllite and fractured very weak metasiltstone.

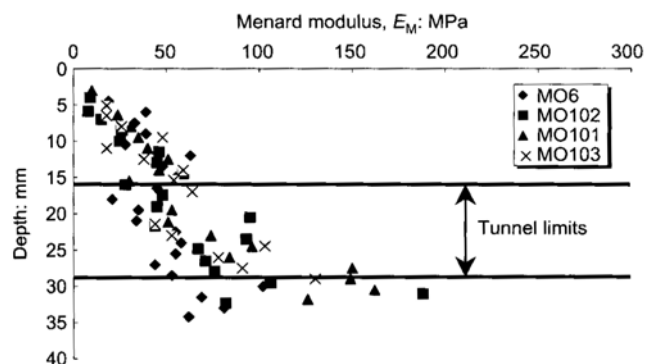


Figure 12. Athens Metro. Distribution of measured Menard moduli E_M with depth

Figure 12 presents the results of Menard type pressuremeter tests, performed in the jet grouting area for the pur-

poses of the ground investigation. According to Figure 12 there is a clear tendency of the Menard modulus E_M (in MPa) to increase with depth. The average values of the Menard modulus in the zone of influence above the tunnel crown is $E_M=40\text{MPa}$, while those at the tunnel's excavation limits are somewhat higher, with average value $E_M=70\text{MPa}$.

Considering the fact that only minor alignment changes of the running tunnel could be implemented and future TBM tunnelling operations had to proceed for a length of 180m approximately, in close proximity and below buildings at very shallow depths (13m approximately), the implementation of certain ground improvement measures for the efficient control of the existing high risk of the over-break failure incidents was of crucial importance for the safety of the existing superstructures. Under these circumstances, the construction of a dense pattern ($\sim 1.10\text{m} \times 2.0\text{m}$) of jet grout columns, in producing a 3.0m thick, relatively stiff arch of grouted soil (with grout to soil fraction 25% - 40%), above the top heading of the tunnel (Figure 13), was considered as the most efficient solution for: (i) controlling the risk of the over - break failures, (ii) minimizing the ground losses at the surface and (iii) accelerating the TBM advance rates.

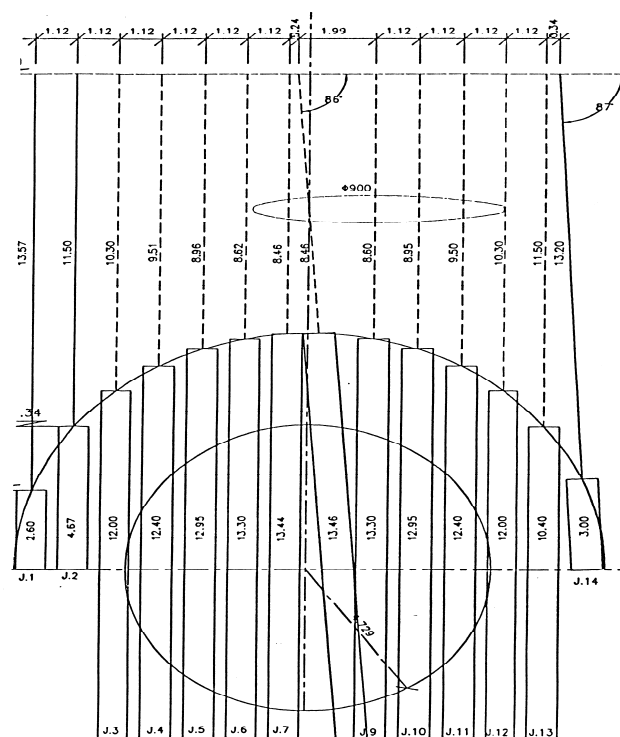


Figure 13. Athens Metro. Jet grouting application

The applicability of the various jet grouting techniques in the geotechnical conditions of the previously mentioned tunnel stretch was decided upon the evaluation of results from extended full-scale trial testing programs, including:

- Vertical and horizontal single jet grouting tests
- Vertical and horizontal double (water-cut) jet grouting tests with and without water pre-cutting,
- Vertical triple jet grouting tests with water pre-cutting.

The evaluation of the performed trial test results was made by correlating the applied specific jet grouting energy values E_s with the achieved grouted columns diameter D . It is explained that for a unit length of a column, the specific jet grouting energy E_s (MJ/m) depends mainly on the: (i) grout pressure P (MPa), (ii) grout flow rate Q (m^3/hr), and (iii)

withdrawal speed V_t (m/hr) and is mathematically expressed by the equation (4):

$$E_s = \frac{PQ}{V_t} \quad (4)$$

The derived relationship between the achieved grouted columns diameter, D (cm) and the specific jet grouting energy, E_s (MJ/m) is remarkably fitted with the curve of Figure 14. This curve is mathematically expressed by equation (5) [7] :

$$E_s = 0.0101 \times D^{2.02} \quad (5)$$

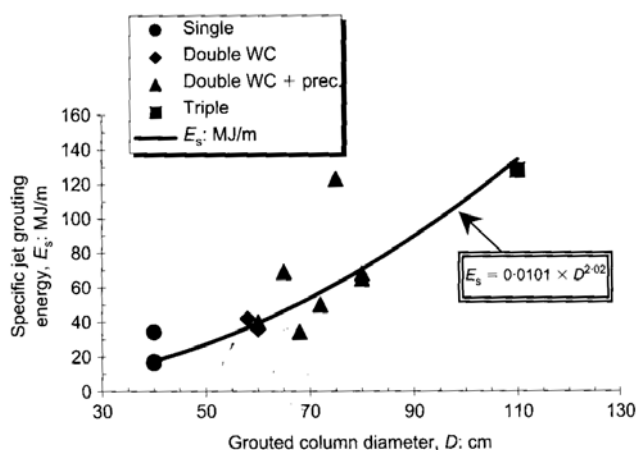


Figure 14. Athens Metro. Specific Jet grouting energy E_s versus grouted column diameter D

According to Figure 14, the successful execution of the various jet grouting techniques can be related to the different ranges of the applied specific jet grouting energy, but always it is related to the encountered geotechnical conditions. More specifically, for the aforesaid weak rock conditions of the jet grouting application area of the Athens Metro project, the following conclusions can be safely drawn:

- Single jet grouting can be executed with specific energy levels between 17MJ/m - 30MJ/m. Grouted columns with diameter of 40cm approximately can be successfully achieved.
- The successful application of double jet grouting needs specific energy levels ranging between 40MJ/m to 80MJ/m. Especially, if the specific jet grouting energy of double jet grouting system (water-cut) without water pre-cutting is at 40MJ/m - 45MJ/m, grouted columns with diameter of 60cm can be successfully produced.
- Triple jet grouting can be executed with energy not in exceed of 130MJ/m approximately. In this type of jet grouting application, grouted columns with diameter of 100cm are expected to be finally achieved.

The finally adopted jet grouting system for the needs of ground pre-treatment program along the Aghiou Konstantinou TBM tunnel section was the one of the double water-cut system without water pre-cutting. It is noted, that this technique was proved that can produce faster and more economically grouted columns of satisfactory dimensions (approximate diameter $D=0.6m$).

After the completion of the ground pre-treatment program, TBM restarted its operations and achieved an average advance rate of approximately 12m/day, with a maximum of 28m in a single day. The effect of ground treatment on controlling the occurrence of over-breaks was obvious, since large scale failure incidents were eliminated.

A clear overall picture of the distribution of the maximum surface settlements and the relative ground losses along the aforesaid jet grouting zone is given in Figure 15 [8]. The maximum observed settlement did not exceed 43mm and the corresponding relative ground loss was equal to 1% approximately. The appreciable increase of the settlements and the corresponding amounts of relative ground loss, towards the end of the jet grouting pre-treated area, is attributed mainly to the decrease of the grout-to-soil replacement ratio from 40% to 25%.

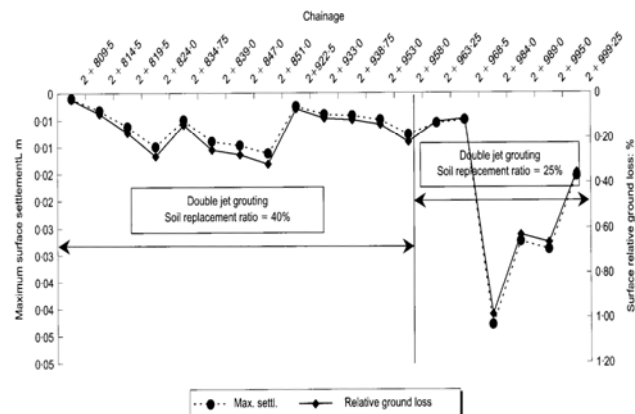


Figure 15. Surface settlement and ground loss distributions along jet grouting zone.

Figures 16 and 17 present the evaluated shapes of the normalized surface settlement troughs obtained from measurement points offset with respect to the axis of Aghiou Konstantinou tunnel, in the areas where the grout - to - soil replacement ratio was 40% and 25% respectively. The decrease of the distance i from 8.0m (in the area with replacement ratio 40%) to 6.5m (in the area with replacement ratio of 25%) could be directly related to the emerged reductions of relative ground losses (as these are shown in Figure 15) since the depth of TBM operations was unaltered. In addition, the application of the following approximate linear expression (6) between the best fit values i and the depth of the tunnel axis H for both pre-treated areas:

$$i = kH \quad (6)$$

estimates k values equal to 0.37 (for soil replacement ratio 25%) and 0.45 (for soil replacement ratio 40%).

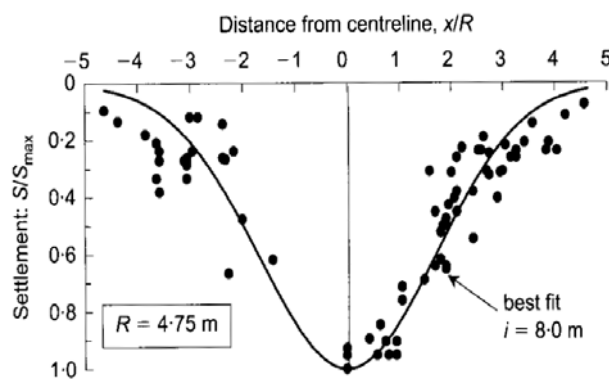


Figure 16. Normalized surface settlement trough in jet grouting

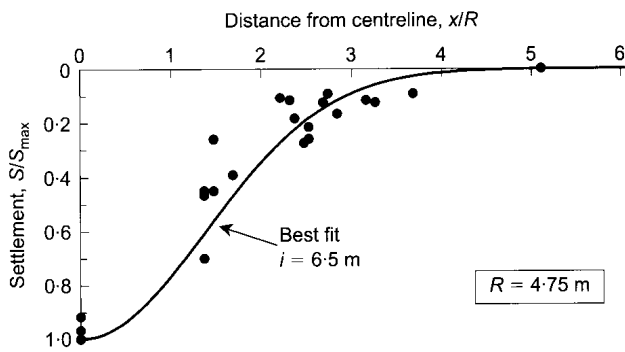


Figure 17. Normalized surface settlement trough in jet grouting area with ground improvement ratio 25%.

3.4. Tunneling construction through a landslide zone – Tunnel S3 of Egnatia Motorway

Tunnel S3 is located at the central section of Egnatia Motorway (Figure 18), west of Thessaloniki, close to Veroia city.



Figure 18. Location of tunnel S3 along Egnatia motorway axis.

The major characteristics of tunnel S3 are summarized as follows:

- It is a relatively shallow twin bored hill slope tunnel. The hill slope has a mild inclination of 20 degrees parallel to the tunnel axis (Figure 19).
- The tunnel total length is 230m.
- The tunnel excavated width is 12m.
- The axial average distance between the two tunnel bores is 30m.
- The maximum overburden height is 30m approximately.

The encountered geological and geotechnical conditions can be summarised as follows:

- Highly tectonised alterations of thin-bedded to mid-bedded limestones and argillaceous phyllites are the dominating geotechnical units along the tunnel axis.
- Highly weathered phyllites are the main type of geomaterial at the tunnel entrance portal area. Locally they are converted to soil-like material. Small to medium size fragments of strong rock are present. The overall mass has been extensively relaxed with open structural discontinuities in places.
- In the tunnel exit portal, the existing phyllites are of better quality, but still with open structure. However, the

layered structure of the phyllites materials is mostly retained.

- No groundwater was found at the underground excavation level.



Figure 19. A view of the tunnel S3 entrance portal.

Overall, it is very difficult to adopt a strictly confirmed geotechnical model, in terms of detecting the specific generative causes for the situation of the geological formations in the tunnel's area. It must be emphasized that the geologic surface formation in the vicinity of the tunnel are in limit post – equilibrium situation, characterised also by a significant slope relaxation process in the geologic history and meta – stability marginal conditions

The critical stability conditions were recognised immediately after the initiation of the underground excavations, as: (a) significant damage of the tunnel's temporary invert (Figure 20) and (b) extended tensional cracking on the ground surface upstream of the hill (Figure 21), were evolved even during the stoppage of all the construction activities. It became obvious, from the evaluation of the results of the installed instrumentation, that an instability mechanism was triggered with the characteristics of a cross slope downhill circular failure.



Figure 20. Significant cracking of temporary invert.



Figure 21. Extended tensional cracking of the ground surface upstream on the hill.

Figure 22 presents the recorded ground surface displacements along the tunnel's complete length, immediately over the two tunnel bores. The major conclusion, which can be derived from Figure 22, is that the directional hill movement, towards its toe, was characterised by large total displacements, at the range between 200mm to 600mm. The instability phenomenon was developed with less degree of severity in the tunnel exit, something which has to be attributed to the better quality of the phyllites formation in this area.

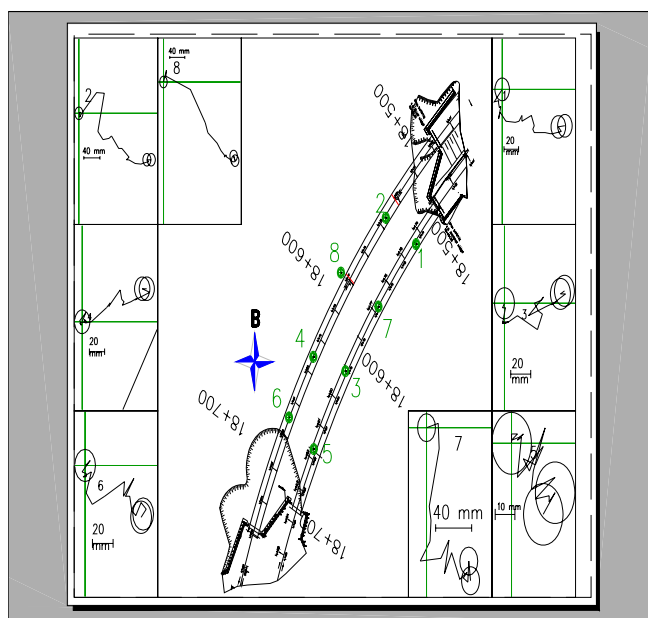


Figure 22. Recorded ground surface movements over the two bores of S3 tunnel.

The need to stabilise long-term the already activated sliding mechanism, without considering any beneficial effect from the tunnel's final lining, was considered as the only solution for the restart of the underground works and the completion of the tunnel's construction. The applied stabilisation solution (Figure 23) was comprised of:

- The construction of 30m long concrete retaining pile wall of 1.0m in diameter, anchored every 2.0m (in the longitudinal direction) in the sound bed rock. This pile wall aimed to function as an upstream "barrier" of the occurred ground movements at the top of the failure mechanism.
- The stabilisation cement grouting from inside of the tunnel bores. This practice aimed to the improvement of strength and deformability characteristics of the surrounding destabilised ground masses.

The simultaneous construction of permanent 30m long pre-stressed anchorages, with pre-stressed forces of 600KN, from the right bottom peripheral sides of the two bores. These anchorages and more specifically their forces were considered necessary for providing the beneficial stabilising moments, against the occurred instability mechanism.

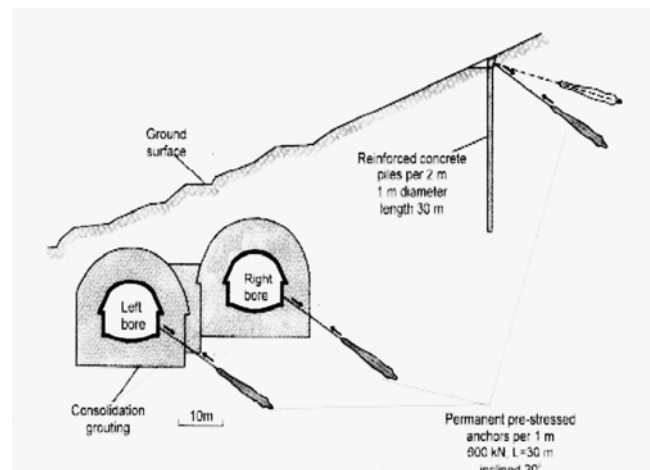


Figure 23. Applied stabilisation solution for tunnel S3.

The available measurements, covering a period of almost 6 years after the completion of tunnel S3, provide enough confidence that the applied solution has achieved its scope of stabilising the occurred failure mechanism.

4. TUNNEL UNREINFORCED FINAL LINING - APPLICATIONS AND LIMITATIONS

The "rising up" of the "tunnel unreinforced final lining" concept in Greece has been directly linked with the design and cost optimisations' needs of the concession highway projects in the last five years. The main scope of the concept's application is to limit the construction budgets of the afore-said projects, at reasonable levels, by avoiding unnecessary over designs in tunnelling, however without risking the final quality and the long term safety and serviceability conditions of the structures.

The existing design and construction experiences in tunnelling worldwide have shown that the concept of the "tunnel unreinforced final lining" is not a prohibitive one. A number of highway and railway tunnels structures, with unreinforced final linings, were constructed successfully and are in full operation over the last 30 years in Europe. However, the recent increasing demand for design and cost optimisation in tunnelling projects, in combination with the recent very restrict design codes' regulations and construction specifications for high level long term safety and serviceability conditions of the underground structures, dictate the need to evaluate in detail the application limits of the concept. These limits are related to the geotechnical environment, the seismic / tectonic regimes and the topographies that tunnels will be constructed.

The relevant European design codes, recommendations and guidelines which offer the necessary design framework of the tunnel unreinforced tunnel final linings are:

- Eurocode 2 EN 1992-1 / Section 12, which defines a number of provisions for plain and lightly reinforced concrete structural members, regarding the concrete properties and the appropriate factors of safety for the materials strength.
- AFTES recommendations focus on to the design of the tunnel final lining members, by imposing a restriction on the possibly developed crack depth ($<h_w/2$) and by limiting the allowable eccentricity ($e < 0.3h_w$) for all load cases, that result in high axial forces N in relation to the concrete strength ($N > 2.7\% (b \times h_w \times f_{ck})$, where: (i) h_w is the overall height of the tunnel cross-section, (ii) b is the overall width of the tunnel cross-section and (iii) f_{ck} is the characteristic concrete strength in compression.

Michalis et al [10] performed a parametric 3-D numerical analysis aiming to examine thoroughly the “safe” application limits of the tunnels unreinforced final linings, within the aforesaid design codes framework. This analysis considered the “three lane” typical open and closed sections of the 2km double tunnel, along Maliakos – Kleidi concession motorway project in central Greece (Figures 24 and 25). The analysis examined only typical Eurocode static design load cases, covering all possible range, from the lining construction stage (at the time of de- moulding with the adoption of the effects of the “young” concrete properties and the concrete’s hydration heat emission) to the possible occurrence of an accidental explosion, inside the tunnel, during its operational period. The analysis focused in homogeneous and in mixed face rock mass conditions, where their deformation moduli varied between 150MPa to 1000MPa.

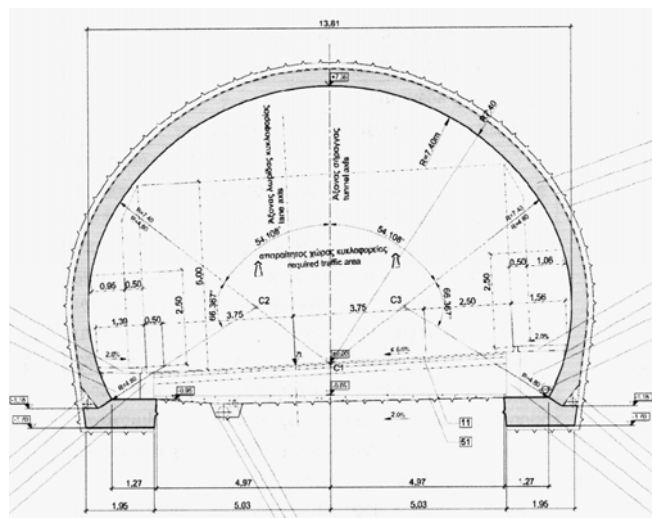


Figure 24. Typical open tunnel section.

Typical finite models, used in the parametric study, are presented in Figures 26 and 27. The complete dynamic analysis of the tunnel unreinforced final lining, by considering real time history earthquake events, is currently under extensive numerical investigation [11]. However some preliminary conclusions from this sensitivity numerical study are presented in the next final paragraphs of the present paper.

The numerical simulation of the constitutive behaviour of the unreinforced concrete was made with the adoption of Willam and Warnke model [12] and by considering the EC-2 stress – strain curve, as well as the EC-2 concrete characteristic strengths and relevant safety factors. The tunnel lining – rock mass interaction was simulated, in detail, with the use of “stick – slip” elastic springs, where their stiffness values were calculated by considering both the surrounding

rock mass deformability properties and the lining geometries (Figure 28).

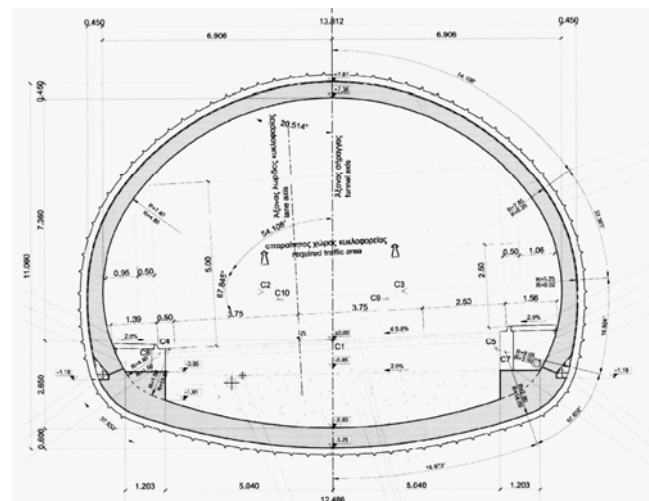


Figure 25. Typical closed tunnel section.



Figure 26. 3-D finite element model of the tunnel final lining

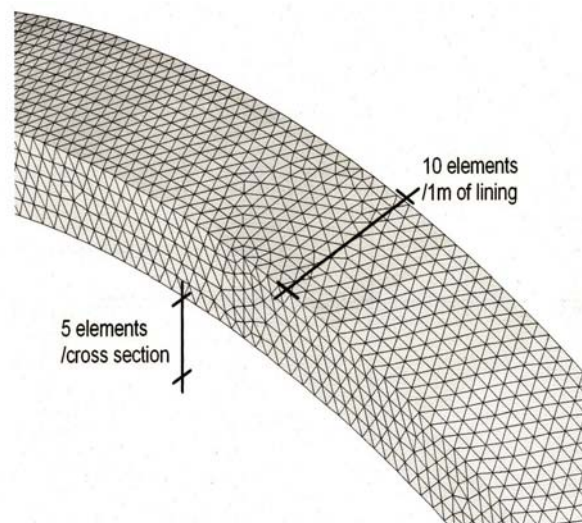


Figure 27. Detail of the 3-D finite element model of the tunnel final lining

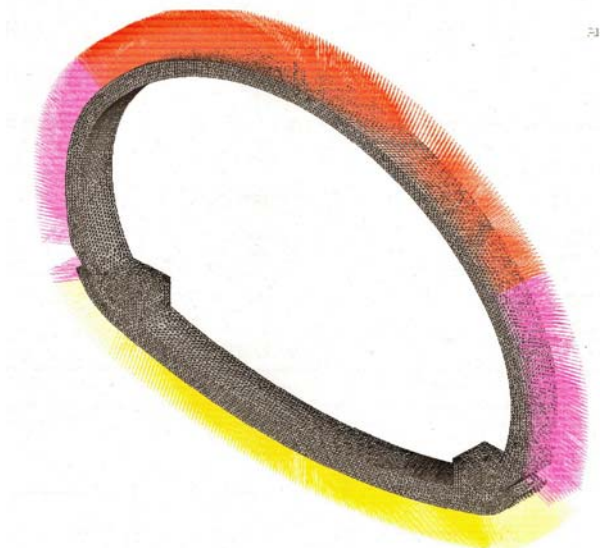


Figure 28. Tunnel lining – rock mass interaction model with “stick – slip” elastic springs, adopted in the parametric analyses

The major conclusions drawn from the previously described parametric analysis can be summarised as follows:

- The structural integrity of the examined tunnel unreinforced (in the vault) final lining sections has been verified in the case of relatively sound rock mass conditions, characterised by deformability modulus $E_m \geq 800\text{MPa}$ - 1000MPa , as it fulfils Eurocode 2 Part 1-1 / Section 12 provisions, regarding plain and lightly reinforced concrete members, and AFTES aforesaid design limiting criterion, in respect to the crack depths and the load eccentricities. The aforesaid range of the surrounding rock mass E_m values create enough confidence that the unreinforced (in vault) final linings can be applied even for tunnels that cross high seismic areas, or areas with adverse topographic morphology and relatively low covers.
- In cases where the surrounding rock mass conditions are characterised by deformability modulus $300\text{MPa} < E_m < 800\text{MPa}$, significant cracking depth occurs in the unreinforced tunnel vault, which exceeds the half of the tunnel section's height, in combination to the formulation of secondary horizontal cracking (Figure 29), thus jeopardizing the initiation of spalling phenomena. The long term structural integrity of the tunnel unreinforced vault final lining can not be achieved, especially in seismic areas.
- In cases, where the surrounding rock mass conditions are characterised by deformability modulus $E_m \leq 300\text{MPa}$, the unreinforced concrete sections cannot be applied, because of the high risk of the concrete crushing (Figure 30).
- The footings areas and the invert sections (if exist) must be reinforced for any quality of the surrounding rock masses.
- An accidental explosion, inside the tunnel, will result to severe cracking of the unreinforced final lining at the lower bottom arches of the vault (Figure 31). However, by considering the locations that these cracks are expected to appear and the calculated displacement patterns, no collapse mechanism of the lining can be formulated. However, repairing works after the explosion will be necessary.
- In tunnel portal areas the tunnel unreinforced final lining must be avoided, as well as in areas where the existence of nearby or crossing active faults have been recognised.

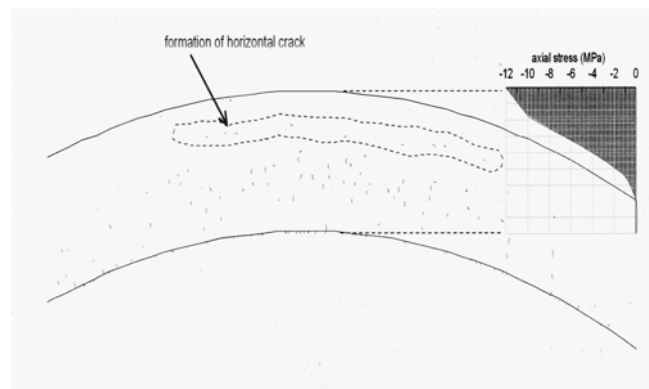


Figure 29. Cracking formation of the unreinforced vault of the final lining. Rock mass deformability modulus $300\text{MPa} < E_m < 800\text{MPa}$

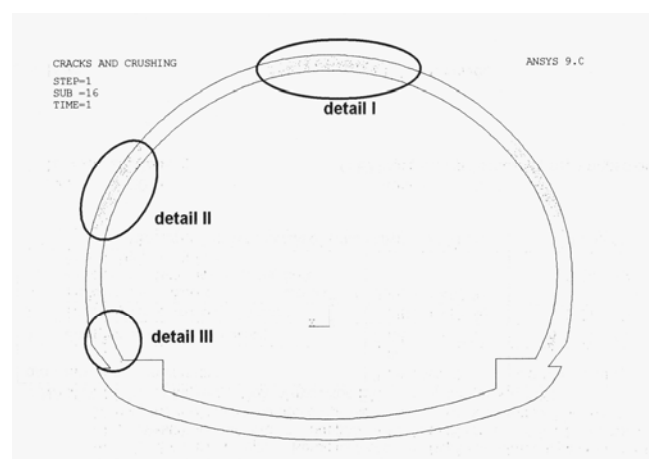


Figure 30. Extensive and severe cracking of unreinforced tunnel final lining in rock mass conditions with $E < 300\text{MPa}$.

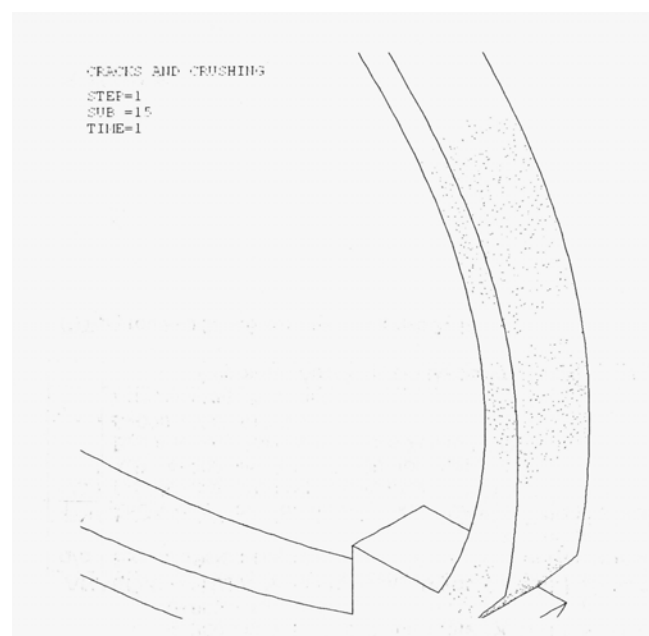


Figure 31. Pattern of cracking of unreinforced tunnel final lining due to explosion

5. CONCLUSIONS

Since the early 1990s, numerous challenges in designing and completing successfully the construction of a significant number of large scale infrastructure projects have been faced in Greece. In these projects, tunnelling was a significant part, mostly related to real challenging engineering

problems. The solutions of these problems demanded the combination of the detailed knowledge of the in-situ geological and geotechnical conditions, with the implementation of innovative design ideas and construction techniques.

New design methodologies were developed aiming to provide technically sound solutions to challenging tunnelling cases. These methodologies focused on to the better understanding of the real complex and adverse geological and geotechnical conditions of Greece, as well as to the more accurate qualitative and quantitative appreciation of the criticality of the tunnelling problems.

The gained experiences from the successful construction of difficult tunnel cases in Greece can provide the successful and economic application frameworks of innovative techniques, aiming to control the geotechnical risk in adverse ground conditions.

These experiences, accompanying with the corresponding design methodologies, are ready to be transferred in future tunnelling projects worldwide.

ACKNOWLEDGEMENT

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ΠΡΟΣΕΧΕΙΣ ΕΚΔΗΛΩΣΕΙΣ ΓΕΩΤΕΧΝΙΚΟΥ ΕΝΔΙΑΦΕΡΟΝΤΟΣ ΣΤΗΝ ΕΛΛΑΔΑ

ΗΜΕΡΙΔΑ ΓΙΑ ΤΙΣ ΓΕΦΥΡΕΣ

Ημερίδα με θέμα «**Συντήρηση και Επιδιόρθωση Γεφυρών**» θα διεξαχθεί την **Δευτέρα 28 Ιανουαρίου 2013** (ώρα προσέλευσης 9:30 π.μ.) στην **Αίθουσα Τελετών** του **Εθνικού Μετσόβιου Πολυτεχνείου** (Κτίριο Διοίκησης, Πολυτεχνειούπολη Ζωγράφου).

Η επιστημονική εκδήλωση διοργανώνεται από την **Ελληνική Εταιρεία Μελέτης των Γεφυρών (ΕΕΜΕΓ)** και την **Σχολή Πολιτικών Μηχανικών** του **Ε.Μ.Π.**

Θεματολογία:

- Ιστορική αναδρομή
- Παλαιά μεταλλικά γεφύρια
- Πέτρινα γεφύρια – Απογραφή – Ζημιές
- Λίθινες γέφυρες στην Ανατολική Μεσόγειο – Ζητήματα Δομής – Τρωτότητας
- Τεχνικές παρακολούθησης δομικής κατάστασης γεφυρών με δίκτυα αισθητήρων
- Κλασικός υπολογισμός και ανάλυση λίθινων γεφυρών
- Παρακολούθηση και συντήρηση μεταλλικών γεφυρών
- Συντήρηση μεταλλικής γέφυρας
- Γέφυρα «Χαρίλαος Τρικούπης» – Συντήρηση και επισκευή
- Κατασκευή – Επιδιόρθωση λίθινων γεφυρών

Συμμετοχή ελεύθερη (με σειρά προτεραιότητας, κατόπιν δηλώσεων).

e-mail: michalts@central.ntua.gr, rafto@central.ntua.gr, kvspilio@central.ntua.gr

τηλ.: 210-7723443, 210-7722454, 210-7721603



ΠΑΝΕΛΛΗΝΙΟ ΣΥΝΕΔΡΙΟ ΙΣΤΟΡΙΑΣ ΤΩΝ ΕΠΙΣΤΗΜΩΝ ΚΑΙ ΤΗΣ ΤΕΧΝΟΛΟΓΙΑΣ

ΠΡΟΣΚΛΗΣΗ ΕΚΔΗΛΩΣΗΣ ΕΝΔΙΑΦΕΡΟΝΤΟΣ

Η Εταιρεία Μελέτης και Διάδοσης της Ιστορίας των Επιστημών και της Τεχνολογίας (ΕΜΔΙΕΤ) και το Τμήμα Μεθοδολογίας, Ιστορίας και Θεωρίας της Επιστήμης (ΜΙΘΕ) του Πανεπιστημίου Αθηνών διοργανώνουν Πανελλήνιο Συνέδριο Ιστορίας των Επιστημών και της Τεχνολογίας στις 28, 29 και 30 Μαρτίου 2013 στην Αθήνα.

Μετά το πρώτο επιτυχημένο συνέδριο νέων ερευνητών το 2011 στην Αθήνα, η ΕΜΔΙΕΤ σε συνεργασία με το ΜΙΘΕ αποφάσισε να καθιερώσει τη διοργάνωση συνεδρίου κάθε δύο χρόνια, αποσκοπώντας στην καλλιέργεια συνθηκών που θα φέρουν σε επαφή μεταξύ τους Έλληνες ερευνητές από τον χώρο της ιστορίας των επιστημών και της τεχνολογίας, καθώς και συγγενών κλάδων, που εργάζονται στην Ελλάδα ή το εξωτερικό.

Η κεντρική θεματική του φετινού συνεδρίου είναι «Ευρώπη - Επιστήμη - Τεχνολογία».

Όσοι ενδιαφέρονται καλούνται να υποβάλουν σχετική πρόταση για ανακοίνωση. Προτάσεις που δεν εμπίπτουν στη θεματική αυτή μπορούν επίσης να υποβληθούν. Σημειώνεται ότι ενθαρρύνονται ιδιαίτερα οι προτάσεις για την οργάνωση συνεδρίων για όλες προβλέπεται η ύπαρξη σχολιαστή. Τέλος, προγραμματίζεται η δημοσίευση των ανακοινώσεων μετά από διαδικασία αξιολόγησης.

Οι ενδιαφερόμενοι μπορούν να υποβάλουν τις προτάσεις τους ηλεκτρονικά με τα επισυναπτόμενα δελτία μέχρι τις 30 Οκτωβρίου 2012 στη διεύθυνση info@emdiet.gr.



2^ο ΠΑΝΕΛΛΗΝΙΟ ΣΥΝΕΔΡΙΟ ΦΡΑΓΜΑΤΩΝ ΚΑΙ ΤΑΜΙΕΥΤΗΡΩΝ

Σχεδιασμός – Διαχείριση – Περιβάλλον
Αθήνα, 7 - 8 Νοεμβρίου 2013
www.eemf.gr

Μετά το πολύ επιτυχημένο πρώτο συνέδριο στη Λάρισα το 2008, η Ελληνική Επιτροπή Μεγάλων Φραγμάτων (ΕΕΜΦ) διοργανώνει το **2ο Πανελλήνιο Συνέδριο Φραγμάτων και Ταμιευτήρων στις 7 & 8 Νοεμβρίου του 2013 στην Αθήνα, στην Αίγλη Ζαππείου**.

Η απαίτηση για ορθολογική διαχείριση του υδατικού δυναμικού είναι μεγαλύτερη παρά ποτέ. Στις αυξανόμενες ανάγκες για ύδρευση, άρδευση, ενέργεια και αντιπλημμυρική προστασία προστίθεται ολοένα και πιο επιτακτικά η ανάγκη για προστασία και επανατροφοδότηση των υπόγειων υδροφόρων και η αναβάθμιση και προστασία των ποτάμιων και λιμναίων οικοσυστημάτων.

Ο ρόλος των φραγμάτων και ταμιευτήρων είναι κομβικός για την αντιμετώπιση των ανωτέρω. Η χώρα μας, αν και καθυστέρησε σημαντικά στην εκμετάλλευση του υδάτινου δυναμικού, έχει κατασκευάσει τις τελευταίες δεκαετίες μεγάλο αριθμό φραγμάτων, και ταμιευτήρων, ενώ ένας μεγάλος αριθμός νέων έργων είναι τώρα σε φάση μελέτης ή υλοποίησης.

Τα φράγματα και οι ταμιευτήρες είναι πολύπλοκα έργα με πολλές συνιστώσες που δημιουργούν αυξημένες απαιτήσεις κατά το σχεδιασμό, την υλοποίηση και τη λειτουργία τους. Ο σεβασμός στο περιβάλλον, η ολοκληρωμένη διαχείριση των υδατικών πόρων, η χρήση νέων τεχνολογιών, η μακροχρόνια συμπεριφορά και ασφάλεια, η ευθύνη του κυρίου του έργου ή του διαχειριστή για την ασφαλή λειτουργία των έργων, είναι θέματα στα οποία θα επικεντρωθούν οι εργασίες του συνεδρίου.

Το συνέδριο στοχεύει στην παρουσίαση, ανάδειξη και συζήτηση των ανωτέρω ζητημάτων και απευθύνεται σε όλους

όσοι με την μελέτη, κατασκευή και διαχείριση έργων φραγμάτων και ταμιευτήρων.

Θεματολόγιο

1. Φράγματα και Ολοκληρωμένη Διαχείριση Υδατικών Πόρων

- Ο ρόλος των ταμιευτήρων στην ολοκληρωμένη διαχείριση υδατικών πόρων
- Ταμιευτήρες πολλαπλού σκοπού
- Αντιπλημμυρική προστασία
- Τεχνικο-οικονομικά κριτήρια υλοποίησης νέων φραγμάτων
- Ο ρόλος των φραγμάτων στον ενεργειακό σχεδιασμό - Σύγχρονες τάσεις και τεχνολογικές εξελίξεις
- Ταμιευτήρες - Αντλητικά και υβριδικά συστήματα παραγωγής ενέργειας

2. Εξελίξεις στις Μεθόδους Σχεδιασμού & Κατασκευής

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- Έργα στεγάνωσης και αποστράγγισης φράγματος και θεμελίωσης
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- Εξελίξεις στον γεωτεχνικό σχεδιασμό
- Εξελίξεις στον αντισεισμικό σχεδιασμό
- Εξελίξεις στον Η/Μ εξοπλισμό

3. Ασφάλεια Φραγμάτων και Ταμιευτήρων

- Κανονισμοί μελέτης, κατασκευής και λειτουργίας φραγμάτων
- Η πρόταση της ΕΕΜΦ για την σύνταξη εθνικού κανονισμού ασφάλειας φραγμάτων
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- Απαιτήσεις παρακολούθησης συμπεριφοράς
- Ασφάλεια ταμιευτήρα (ευστάθεια πρηνών, εκτεταμένες διαρροές κτλ)
- Αναλύσεις θραύσης φράγματος και επιπτώσεις
- Μακροχρόνια συμπεριφορά, γήρανση των έργων και εργασίες αποκατάστασης
- Κίνδυνοι οφειλόμενοι σε αστοχίες Η/Μ εξοπλισμού
- Παρουσίαση πρόσφατων συμβάντων ή περιστατικών
- Φράγματα, ταμιευτήρες και δημόσια ασφάλεια
- Ασφαλής παροχέτευση εκτάκτων πλημμυρικών παροχών κατάντη - απαιτήσεις οριοθέτησης της κοίτης

4. Φράγματα, Ταμιευτήρες και Περιβάλλον

- Φιλικές προς το περιβάλλον κατασκευές φραγμάτων και ταμιευτήρων
- Φράγματα, ταμιευτήρες και αειφορία
- Περιβαλλοντική και κοινωνικά αποδοχή φραγμάτων και ταμιευτήρων - Συμμετοχικές διαδικασίες στο σχεδιασμό και υλοποίηση
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- Χρονική εξέλιξη των ποιοτικών χαρακτηριστικών των ταμιευτήρων - Διατήρηση και βελτίωση ποιότητας υδατικών πόρων

- Φερτές ύλες

5. Παρουσίαση έργων

Κρίσιμες ημερομηνίες για την αποστολή εργασιών:

- Υποβολή περιλήψεων: **15 Δεκεμβρίου 2012**
- Αποδοχή περιλήψεων: **15 Ιανουαρίου 2013**
- Υποβολή πλήρους κειμένου: **30 Απριλίου 2013**
- Αποδοχή πλήρους κειμένου: **30 Ιουνίου 2013**

Οδηγίες για την αποστολή των περιλήψεων θα βρείτε στη ιστοσελίδα της ΕΕΜΦ www.eemf.gr.

Οι περιλήψεις θα αποστέλλονται ηλεκτρονικά στην διεύθυνση της ΕΕΜΦ eemf@eemf.gr.

ΕΛΛΗΝΙΚΗ ΕΠΙΤΡΟΠΗ ΜΕΓΑΛΩΝ ΦΡΑΓΜΑΤΩΝ, μέσω ΔΕΗ - ΔΥΗΠ, Αγησιλάου 56-58, 104 36 ΑΘΗΝΑ, τστ. 210 - 5241223, Η/Δ : eemf@eemf.gr, www.eemf.gr

ΝΕΑ ΑΠΟ ΤΙΣ ΕΛΛΗΝΙΚΕΣ ΚΑΙ ΔΙΕΘΝΕΙΣ ΓΕΩΤΕΧΝΙΚΕΣ ΕΝΩΣΕΙΣ



Στην ιστοσελίδα της ΕΕΣΥΕ στην ενότητα Δραστηριότητες - Ημερίδες Συνέδρια - Trends and Practices in Financing and Contracting (http://www.eesy.gr/index.pl/conferences_gr) έχουν αναρτηθεί και είναι προσβάσιμες ορισμένες από τις παρουσιάσεις του συμποσίου **"PRACTICES AND TRENDS FOR FINANCING AND CONTRACTING TUNNELS AND UNDERGROUND WORKS"**. Οι υπόλοιπες θα αναρτηθούν (ελπίζουμε) σύντομα.

Επί πλέον, οι υπάρχουσες πλήρεις εργασίες του συμποσίου έχουν εκδοθεί από την ΕΕΣΥΕ σε έντυπη μορφή και διατίθενται προς πώληση στην τιμή των 25 ευρώ (λίγο κάτω από το κόστος εκτύπωσης). Απλά στείλτε μας ένα e-mail .

Τις επόμενες ημέρες θα σας γνωστοποιήσουμε (και μέσω του επόμενου Δελτίου σηράγγων) τις λεπτομέρειες για το συνέδριο 2nd Eastern European Tunnelling Conference 2014 Athens που προγραμματίστηκε να γίνει στην Αθήνα το διάστημα 1/9/2014 - 3/10/2014. Κάντε τους προγραμματισμούς σας και αρχίστε να σκεπτόσαστε τις περιλήψεις που θα υποβάλλετε.

Πολλές ευχές για χρόνια πολλά και καλή χρονιά.

Χαιρετισμούς

Γιάννης Μπακογιάννης
Μεταλλειολόγος Μηχανικός ΕΜΠ
Πρόεδρος ΕΕΣΥΕ
Υπουργείο Υποδομών, Μεταφορών και Δικτύων
Διοικητική Αρχή Οδικών Σηράγγων
Ειδική Υπηρεσία Έργων Παραχώρησης Πελοποννήσου
Τηλ.: +302106996628, +302265033232, +306947697197
e-mail: bakojon@otenet.gr



ISSMGE TC 211 GROUND IMPROVEMENT

Symposium IS-GI Brussels 2012

The International Symposium TC 211 IS – GI Brussels 2012 was a very great success due to the very large attendance

(max. capacity of 280 persons fully booked), the very interesting contributions, the nice technical exhibition and the pleasant atmosphere.

During the symposium 7 plenary Technical Sessions were held. Each session existed out of the presentation of a geo-technical report followed by the presentation of 4 selected papers and a discussion.

During the symposium the *Louis Menard Lecture* was given by Dr. Ir. Patrick Mengé of DEMA on Recent Advances and Execution Aspects in Ground Improvement in Dredging and Environmental Marine Engineering and a *specialty lecture* was given by ISSMGE Chairman Prof. J.L. Briaud on Design Guidelines and Full Scale Verification for MSE Walls with Traffic Barriers Impacted by Vehicles.

The symposium Proceedings edited by Noël Huybrechts and Nicolas Denies of the Belgium Building Research Institute consists of 4 volumes:

- Volume 1 contains the General Reports , the Menard Lecture , the specialty lecture by JL Briaud and some late contributions
- Volumes 2, 3 and 4 contain the contributions to the Symposium.

The Proceedings of the Symposium can be downloaded from the Symposium website www.bbri.be/qo/IS-GI-2012

With contributions of all over the world, the Symposium Proceedings give a very nice overview of recent and actual research on ground improvement. From the discussion during the Symposium it appeared clearly that although a lot of research is being done, the translation of the research results into design methods or executions specifications remains problematic. This is certainly the case for:

- deep compaction of calcareous sands
- the influence of the installation method of vertical drains
- the influence of the equipment on the characteristics of soil mix material
- the design of piled embankments.

ΑΝΑΣΚΟΠΗΣΗ ΓΕΩΤΕΧΝΙΚΩΝ ΕΚΔΗΛΩΣΕΩΝ

40th Annual Conference Foundations Zakládání staveb Brno 2012 Czech Geotechnical Society

Ο Πρόεδρος της ΕΕΕΕΓΜ Χρήστος Τσατσάνιφος προσεκλήθη και συμμετείχε στο 40th Annual Conference Foundations / Zakládání staveb Brno 2012 της Czech Geotechnical Society στις 12 Νοεμβρίου 2012. Κατά την διάρκεια του συνεδρίου, κωλυομένου του συναδέλφου Ηλία Μιχάλη, παρουσίασε την προσκεκλημένη ομιλία «Tunnelling Projects in Greece, Challenges, Gained Experiences and Achievements».



ΠΡΟΣΕΧΕΙΣ ΓΕΩΤΕΧΝΙΚΕΣ ΕΚΔΗΛΩΣΕΙΣ

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

Fourth International Seminar on FORENSIC GEOTECHNICAL ENGINEERING, January, 10-12, 2013, Bengaluru, India, Prof. G L Sivakumar Babu, isfge2013@gmail.com

Geotechnical Special Publication, ASCE "Foundation Engineering in the Face of Uncertainty". Abstracts to Mohamad H. Hussein at: MHussein@pile.com.

Geotechnical Special Publication, ASCE "SOUND GEOTECHNICAL RESEARCH TO PRACTICE", http://web.engr.oregonstate.edu/~armin/index_files/Holtz_GSP

Themed Issue on Geotechnical Challenges for Renewable Energy Developments, Geotechnical Engineering 2013, ben.ramster@icepublishing.com



Induced Seismicity, London 2013 <http://europe.aapg.org/2436>

Induced seismicity is being studied in technologies such as hydraulic fracturing, waste water disposal carbon sequestration and geothermal energy. Incidents such as the ones which took place in Lancashire (UK) and Basel (Switzerland) have led to a demand for more information on how to manage the risks involved in these activities and what the industry can do to address public concern.

AAPG is proud to present Induced Seismicity 2013. This exclusive 2-day conference will bring expert seismologists from academia and government together with executives from the oil and gas industry to explore the key issues in this fast-evolving field. The event will be chaired by Professor Peter Styles of Keele University, a regular advisor to the UK government and a preeminent expert in applied and environmental geophysics.

What's on the Agenda?

- DECC Report on the causation of seismic events in Lanca-

shire in 2011

- U.S. National Research Council study on Induced Seismicity Potential in Energy Technologies
- Case histories of earthquakes induced by the injection of waste-water at depth in the U.S.
- Risk management considerations associated with injection operations
- The latest micro-seismic monitoring technologies
- The scope for regulation of induced seismicity and its potential impact on exploration
- Industry perspectives from the likes of Cuadrilla, Exxon-Mobil and Schlumberger

Why Attend?

New exploration prospects are opening up in developed countries such as the UK. It is unsurprising that in such highly populated areas there is great concern about the environmental impact of onshore operations. Effective risk management and careful monitoring of operations is essential if resources are to be maximised. This event aims to help industry professionals address the challenges as induced seismicity and promote responsible exploration and production.

For further information on this conference please contact AAPG Europe, London Office
E: europe@AAPG.org
T: +44 (0) 207 434 1399



Pam-Am UNSAT 2013 First Pan-American Conference on Unsaturated Soils, 19-22 February 2013, Cartagena de Indias, Colombia, panamunsat2013.uniandes.edu.co

ICGE'13 3rd International Conference on Geotechnical Engineering New Developments in Analysis, Modeling, and Design, 21-23 February 2013, Hammamet, Tunisia
www.icge13.com



Organised by: **INSTRUMENTATION & MONITORING**

Pre-conference masterclass: 26 February 2013
Full-day Conference: 27 February 2013

Geotechnical and structural best practice, innovation and data analysis

Geotechnical and structural best practice, innovation and data analysis

26-27 February 2013, London, UK
<http://www.gemonitoring.com>

Are you a client or contractor procuring the monitoring work? A consultant writing the spec? A manufacturer, supplier or installer of the instrumentation?

Whatever part you play, Instrumentation and Monitoring will present you with the opportunity to network and engage with key industry leaders and receive essential updates on the latest technologies and techniques for effectively monitoring your project or assets.

Attend Instrumentation and Monitoring to share best practice with your peers and hear about challenging projects using innovative techniques and new technology.

Find out the answers to the questions the industry is asking:

- How is the monitoring of Crossrail progressing and developing as construction begins?
- Who should be responsible for procuring and writing the specifications for a project?
- How should structural and geotechnical monitoring relate to each other to support project delivery?
- Is data collection or data collation the greatest challenges facing instrumentation and monitoring?
- What type of monitoring is most suitable to managing multi assets at risk of failure?

Programme highlights for Instrumentation and Monitoring 2013 include:

- Two Crossrail case studies focusing on how instrumentation and monitoring is being delivered and what challenges lie ahead as construction accelerates
- Exploring the benefits to project delivery of collaborative geotechnical and structural monitoring – are you taking the right steps?
- In what way will monitoring need to change in the future to meet industry demands?
- How can the industry match advancements in data collection with its interpretation and analysis?
- Copenhagen City ring case study: what are the latest results showing and how is monitoring benefitting tunnel construction and affecting delivery



TUNNELLING ASIA' 2013

Using Underground Space in Urban Cities: Issues & Challenges

26-28 February, 2013, India Habitat Centre, New Delhi

On behalf of the Organising Committee of the **Tunnelling Asia' 2013 - Using Underground Space in Urban Cities : Issues and Challenges**, I take great pleasure in extending a cordial invitation to individuals, Regulatory Bodies, Govt. Departments, Tunnel Building Contractors and Consultants, Manufacturers, Technical Research Institutes, Universities and Funding Agencies, who are all actively involved in the tunnel and underground construction, to participate in the exciting conference from 26-28 February 2013 at New Delhi. This conference is being organized by the Tunnelling Association of India in association with the Central Board of Irrigation and Power under the aegis of International Tunnelling and underground Space Association (ITA).

I also extend a cordial invitation to all the National Committees of ITA and the agencies involved in tunnel and under-

ground construction including planners, designers, geologist, construction firms, consultants, insurance agencies, equipment manufacturers to participate in the exhibition being organized from 26-28th February 2013 in conjunction with the Tunnelling Asia' 2013 conference at New Delhi. In view of many underground structures under construction are being planned in this country, there is vast scope for such agencies from outside the country, to participate in these construction works by demonstrating their capability either in providing services or equipment by taking part in the exhibition.

We look forward to welcoming you in New Delhi, and hope that your stay and experience here will be a memorable one.

Mangu Singh
Chairman Organising Committee &
President, Tunnelling Association of India &
Managing Director
Delhi Metro Rail Corporation

Location of various facilities underground will be the order of the day in the immediate future to ensure sustainable life for future societies by providing necessary infrastructure to accommodate transportation, communication utility networks and complexes for handling, processing and storage of many kinds of materials, more so in urban areas which will have to accommodate large populations. Application of new technologies besides use of sophisticated equipment for underground construction works would be warranted for execution of works in a cost effective manner conforming to sustainable development. With rapid growth of underground structures anticipated, there will be evolution of new technologies and innovative construction practices.

In India, considerable tunnelling activities in the field of tunnelling are in progress for the execution of water resources projects for irrigation, hydropower generation, building of roads in mountainous areas, subsurface excavations for underground railway, underground storages for petroleum products and for mining purposes.

With a view to provide information at international level of knowledge and experience gained in the large scale underground structures and tunnel projects for the benefit of future projects throughout the world, delegates will be provided with a unique opportunity through this conference to facilitate exchange of views and ideas with professionals who have been actively involved in the success of the tunnel projects. A large number of experts are likely to participate to stimulate the debate on the challenges met and the lessons learnt, with the application of new practices and technologies.

It is in this context this International Conference "Tunnelling Asia' 2013", is being organised which would be unique experience for the participant.

TOPICS

Planning, Investigation and Design of Tunnel, Cavern & Underground Projects

- Planning, Investigation and Interpretation of Geological Data;
- Engineering Classification and Characterization of Rock Mass;
- Hydraulic and Structural Design of Tunnels;
- Stabilization and Support System for Tunnelling;
- Determination of In-situ Stresses for Underground Excavation;
- Instrumentation Monitoring, Back-analysis and Modelling Methodologies;

- Analysis and Design Methodologies including Effect of Seismicity on the Underground Structure.

Tunnel & Cavern Construction Technologies and Equipment

- Construction Methodologies for Tunnels, Caverns, Underground Storages including Remedial Measures for Large Collapses;
- Tunnelling in Urban Areas - Cut & Cover method and TBM Tunnelling
- Cut and cover construction above the bored Tunnel.
- Soft Ground Tunnelling including Shotcrete Methods;
- New Developments – TBM Performance and NATM Experiences;
- Trenchless Technology – Practice and Evaluation;

Risk Management

- Better Preparedness against Tunnel Related Natural Hazards;
- Risk Analysis and Decision-making Techniques for Large Underground Projects.

Environmental and Social Impacts

- Environmental and Social Impact Assessment of Underground Works and their Norms and Methodologies;
- Environmental Control in Tunnel / Cavern and Underground Spaces;
- Effective Ventilation in Tunnels and Practices.

Safety Issues – Standards and Policies

- Fire Safety Arrangement and Measures in Tunnels and Transport;
- Safety Standards and Policies in Different Countries and New Developments.
- Traffic Management while construction of underground space.

Contract Management and Financing of Underground Construction Works

- Costing and Contractual Practices in Tunnel and Underground Works including Aspects of Measurements and Payment;
- Experience and Structure of Model Contract Document;
- Project and Equipment Financing of Build Operate Transfer (BOT) Projects;

Research & Development

- Robotisation of TBM Tunnelling

INDUSTRY SPECIAL ASPECTS

In addition, the following Tunnel and Underground Industry special aspects will also be covered during the conference:

1. Mechanised Tunnelling Equipment

Tunnel Boring Machines

- Case Histories for tunneling in Urban areas
- Monitored disk cutters
- Cutter optimization
- Large diameter TBM
- Solution for Mechanised Tunnelling

2. Drill and Blast Method

Roadheaders

- Use of road header in tunnel and underground construction
- Instrumented road headers
- Tool optimization
- Conquering different ground

3. Innovation in Concrete Pumps, Formwork, Ventilation Fan and Instruments for Underground Construction

4. Materials

- Innovation in materials, segments and shotcrete
- Future development of shotcrete lining and associated methods
- Innovation in materials, segments and shotcrete
- Speed Dam/ Smart Dynamic Concrete
- Use of Fibres (plastic and steel) for fire control

5. Waterproofing

- Overview of the Waterproofing for Tunnels and Underground Structures
- Waterproofing Methods and Case Histories : Injections, Pregrouting, Membrane Sheets, Spray-on Water Proofing Membranes
- Composite Tunnel Lining,
- Contractual Aspects, Liability and Costs
- Fire protection during Construction and Consequences during Operation

Conference Secretariat

Secretary

Central Board of Irrigation & Power

Malcha Marg, Chanakyapuri, New Delhi - 110 021, India

Phone : 91-11-2611 5984 / 2611 1294 Ext. 113;

Fax : 91-11-2611 6347

Contact Person : Mr. A.C. Gupta (Mobile No 91-9871995996) /

Mr. Sunil Sharma (Mobile No 91-9811299136)

Email : cbip@cbip.org; sunil@cbip.org

Website : www.cbip.org



XXXVI Winter School of Rock Mechanics and Geoenvironment, 11-15 March 2013, Kudowa Zdroj, Poland, www.zsmgig.pwr.wroc.pl/?home,11



**International Conference on
Geotechnical Engineering 2013**
March 14th and 15th, 2013, Lahore, Punjab Pakistan
<http://www.pges-pak.org/home/icge-2013>

The Pakistan Geotechnical Engineering Society (PGES) takes pleasure in announcing an International Conference to be held in Lahore in March, 2013. This Conference will be 13th event in a row of national and international conferences held under the auspices of PGES.

The theme of the Conference is kept open to attract a diversity of quality papers from around the globe. The Conference will act as a platform for exchange of technical ideas between Clients, Consultants, Contractors and Manufacturers. Outstanding keynote lectures, presentations and technical discussions will provide an excellent opportunity to explore the ever-growing and challenging field of Geotechnical Engineering.

The venue of this Conference is deliberately chosen to be the historical city of Lahore. The City of Lahore is known as educational metropolis of Pakistan in addition of being cultural, entertainment and food hub of the country. Lahore is Pakistan's largest producer of professionals in the fields of science, technology, IT, engineering, medicines and nuclear sciences. Lahore also offers both historical and cultural attractions, including exceptional Mughal Architecture and many easily accessible cultural tours whether delegates are attracted to world class theatres, museums, cultural attractions, unique shopping areas, exceptional restaurants or thematic neighborhoods, Lahore's diversity of attractions ensures that there is always something for everyone.

This Conference will provide a great opportunity to the engineers, geologists, seismologists and other professionals engaged in the field of geotechnical engineering, foundation design, construction and manufacturing, to share their expertise in the realm of Geotechnical Engineering. The Conference will help bring together the knowledge available in this field, for future guidance

Papers to be presented in the Conference may be related to any aspect of Geotechnical Engineering. However, the Organizing Committee suggests the following main themes:

1. Field Investigations/Testing
2. Analysis and Design
3. Problematic Soils
4. Earthquake Engineering
5. Ground Improvement
6. Landsliding / Slope Stability
7. Performance and Monitoring
8. Case Histories

All correspondence and inquiries related to the conference should be addressed to the Chairman, Organizing Committee at the following address:

Dr. Izhar ul Haq
Chairman Organizing Committee
International Conference on Geotechnical Engineering
WAPDA House
Lahore- Pakistan
Tel: +92-42-99202593
Fax: +92-42-99203467
Email: izharhaq43@gmail.com



International Conference on «Landslide Risk» ICLR13, 14 – 16 March 2013, Drahm, Tunisia, <http://www.iclr13.com>

TU-SEOUL 2013 International Symposium on Tunnelling and Underground Space Construction for Sustainable Development, March 18-20, 2013, Seoul, Korea
www.tu-seoul2013.org



ICLR13

International Conference on «Landslide Risk»
March 14th to 16th 2013, Ain Drahm, Tunisia
www.iclr13.com

Characterization of soil and rock slopes has improved considerably over recent years with the continuous development of prediction methods, monitoring and mitigation techniques. However, seismic effects and dramatic climatic changes, in part due to industrial human activities, make the risk of landslides and their impact on the economical and social activities a serious problem. Also, the population concentration in risky zones increases the potential of critical consequences.

For these reasons important attention is given across the word to landslide risk. Practical and research issues are investigated, which range from prediction and modeling to mitigation and efficient monitoring techniques.

In Tunisia landslides are present in numerous regions. They strongly affect the traffic in many national roads. Recently, on December 2011, in the northwest of Tunisia (Ain-Draham, Beja, Tabarka, Mateur...) large-scale slope failures, triggered by the rainfall, developed suddenly (around 210 cases). Many slopes collapsed catastrophically without prior signs of warning. The mitigation of slope instability and its associated damage remains an essential question for the geotechnical profession in Tunisia. At present, few investigations have been engaged to study the landslide initiation and propagation or to study the rainfall infiltration. Specific attention should be given to the "in situ" hydraulic and environmental conditions, namely the rainfall intensity and evaporation flux as well as its cyclic nature.

The International Conference will promote the debate of relevant issues among engineers and researchers in soil and rock mechanics and in environmental fields. An important challenge for scientists is not only to advance in the knowledge on technical matters but also to promote the teaching of these aspects in a wide sense and to increase the awareness of public and local authorities, as well as civil protection institutions, with regards to landslide risks.

OBJECTIVE

A main objective is to identify emerging developments in the analysis, mitigation and monitoring technologies capable of generating successful methodologies to deal with landslide risk and to contribute to the development of international standards.

The Conference will hopefully provide engineers and decision-makers with improved procedures for the quantitative assessment of Landslide risk.

Special focus is given to:

- Climatic change effects on slope behavior and the effects on the human activities.
- Efficient prediction and modeling and related issues.
- Optimization of tools to monitor and mitigate landslides in different environments, especially in mountainous zones.

The envisaged technical program will be developed around three Workshop Sessions.

A) First session: Field Characterization and Mapping

- Advances in field surveying and mapping technologies
- Geomorphological survey
- Relevant soil properties. Field and laboratory characterization
- Screening and macro-zonation methodologies
- Risk criteria and its evaluation

B) Second session: Prediction and Modeling

The session is dedicated to the development of theoretical and numerical modeling applied to soil and rock slopes.

These methods should help engineers understand the physical processes of landslides and improve the quality of the prediction tools. The session includes the following topics:

- Stability in rock masses and hard soils/soft rocks
- Progressive failure
- Soil-atmosphere interaction. Extreme events
- Slopes in unsaturated soils
- Earthquake triggering of landslides
- Back analysis of field cases

C) Third session: Mitigation and monitoring techniques

- Practical mitigation solutions for landslides/slope stability problems:
 - Drainage
 - Passive works
 - Anchoring techniques and piles
- Advances in monitoring techniques:
 - Field monitoring
 - Interferometric radar technologies
 - Satellite platforms
 - LIDAR techniques (or Laser Scanner Techniques)
 - Cases studies

Professor Mehrez Zeme
National Engineering School of Tunis
The Civil Engineering Laboratory
BP 37, Le Belvédère 1002 Tunis, Tunisia
Tel : 216 (98) 665 556
Fax: +216 (71) 872 729
For any scientific information address to:

iclr2013@gmail.com



March 18 – 20, 2013, Seoul, Korea

The Korean Tunnelling and Underground Space Association (KTA) would like to invite all of you to the International Symposium on Tunnelling and Underground Space Construction for Sustainable Development (TU-Seoul 2013) to be held in Seoul, Korea from March 18 to 20, 2013. The symposium is the first international event prepared by KTA after the successful 2006 ITA World Tunnelling Congress held in Korea.

The theme of the symposium is "Tunnelling and Underground Construction for Sustainable Development". An intellectually scientific technical program will be prepared in consistent with the theme of the symposium. The symposium will provide participants many opportunities to exchange new information and ideas related to tunnelling and underground space construction industry.

Contact:

Korean Tunnelling and Underground Space Association
General Secretariat
#1411 Seocho Kukge Electronic Center
1445-3 Seocho-dong, Seocho-gu, Seoul 137-728, Korea
Tel : +82-2-3465-3665 Fax : +82-2-3465-3666



4TH ANNUAL TUNNEL DESIGN & CONSTRUCTION ASIA 2013

19 - 20 March, 2013, Singapore

<http://www.tunneldesignconstruction.com/Event.aspx?id=847030>

Best Practices in Geotechnical Investigation, EPC Contracting, Project Funding and Risk Management for Asia's Tunnel Infrastructure.

Developing underground infrastructure for transportation, utilities and for commercial / mixed use purposes has become indispensable in a fast urbanising Asia. With increased number of urban tunnel projects, tunnelling in mixed ground conditions close to existing structures is still costly and risky.

The 4th annual Tunnel Design & Construction Asia conference will feature experts from regional tunnel projects to share the best practices in cost effective engineering and construction of urban underground projects.

Attend the conference and get a rare opportunity to hear exclusive case studies from the biggest and most challenging underground projects in Asia including:

- KL Metro, Malaysia
- Bangkok Metro
- MRT Jakarta
- Cable Tunnel Singapore
- JUSB Railway Link, India
- XRL Hong Kong
- Rohtang Tunnel, India

To find out more, visit www.tunneldesignconstruction.com
To attend the conference, email enquiry@iqpc.com.sg
or call +656722 9388.



International Conference on Installation Effects in Geotechnical Engineering, 24-27 March 2013, Rotterdam, The Netherlands, <http://geo-install.co.uk>

Fifth International Conference on Forensic Engineering "Informing the Future with Lessons from the Past", 16-17 April 2013, London, UK, <http://www.ice-conferences.com/Upcoming-events/Fifth-International-Conference-on-Forensic-Enginee>

EURO:TUN 2013 Computational Methods in Tunneling and Subsurface Engineering, 17-19 April 2013, Bochum, Germany, www.eurotun2013.rub.de

From geological conditions to numerical modeling of underground excavations, 3rd International Conference on Computational Methods in Tunneling and Subsurface Engineering (EURO:TUN 2013), 17-19 April 2013, Ruhr-University Bochum, Germany, <http://minelab.mred.tuc.gr>



12th INTERNATIONAL CONFERENCE
UNDERGROUND CONSTRUCTION PRAGUE 2013



**12th International Conference
UNDERGROUND CONSTRUCTION PRAGUE 2013**
22–24 April 2013, Prague, Czech Republic

http://www.ita-aites.cz/en/conference_underg_constr/conference-uc-2013/

The ITA-AITES Czech Tunnelling Association cordially invites you to 12th International Conference entitled "Underground Construction Prague 2013", which will be held in Prague, the capital of the Czech Republic, from 22 to 24 April 2013. This is the largest Czech tunnelling conference, which is held regularly every three years.

The ITA-AITES Slovak Tunnelling Association and world's leading experts as members of the Scientific Council are also involved in its preparation. The conference programme aims to reflect experience with preparation and implementation of all types of underground structures using both conventional and mechanized methods of excavation.

Despite worsened global economic conditions, the Czech Republic is implementing and preparing significant underground structures, some are extraordinary in their scope and means of implementing. The largest tunnel construction – the Blanka tunnel complex at the Prague city ring with a length of 5.5 km is currently being completed. In full construction is an extension of the Prague metro route V.A, where earth pressure balance shields with diameter of 6 m are deployed, which sets out the sum over 8 km of railway tunnels.

Construction of railway tunnels on IIIrd and IVth railway corridor is intensively prepared, out of which the most important tunnels are Chotůčany (4810 m long) and Ejovice (4150 m long). Construction of the last named tunnel should be initiated in 2012. Extraordinary prospective structures are the Prague metro line D, the new gas tank and the underground storage of radioactive waste. Better times for tunneling are coming to the Slovak Republic, with ongoing competitions for tunnels on the D1 highway (Višňov – 7.5 km long; Šibeník – 0.6 km long; Čebra – 2 km long).

We believe that this conference will be as successful as in 2010, will bring a lot of interesting knowledge and enable participants to gain new contacts. The Czech Republic and in particular its capital city of Prague with its individual charm and many interesting sights is an ideal place for the conference as well as relaxation.

Secretariat of the Preparatory Committee of the Conference:

SATRA, spol. s r. o.,
Sokolska 32, 120 00 Prague 2, Czech Republic
Tel.: +420 296 337 181,
Fax: +420 296 337 189,
E-mail: ps2013@satra.cz



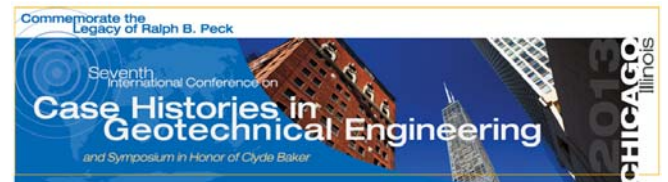
**First International Conference – Seminar on
Deep Foundations in Bolivia**
23-24 April 2013, Santa Cruz de la Sierra, Santa Cruz,
Bolivia

www.cfpbolivia.com

The Conference is the first in its class in Bolivia. The Conference will be during the 23th and 24th, and the seminar during the 24th and 25th of April 2013. Besides that, a prediction event on piles capacities will be performed. Four different types of piles will be installed and monitored with strain gages in at least six levels. The geotechnical information will be available for the public around the 20th of December. The piles will be installed in February and the load tests will be performed during the week before the Conference. All the specialists are invited to participate in these predictions.

The main topics of the Conference-Seminar are related with different technologies of deep foundations, quality controls and ground improvement techniques.

Contact person: Ricardo Soliz
Address: Av. 5o Anillo esq. Radial 27 - PO Box 868, Santa Cruz de la Sierra, Santa Cruz, Bolivia
Phone: +591 3 3429522 (ext 112)
Fax: 342 9525
E-mail: congreso@cfpbolivia.com
Website: www.cfpbolivia.com



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, 29 April – 4 May, 2013, <http://7icchgq.mst.edu>



**2nd International Conference on Solid Waste 2013:
Innovation in Technology and Management**
5 - 8 May 2013, Hong Kong, China

Rapid urbanization and industrial development around the world have put pressure on the society in handling the tremendous increase in volume of wastes of diverse natu-

re, and force us to plan for the next 10-20 years in an immediate manner. Besides, under the threat of global warming, every waste treatment option and technology should be characterized with their contribution to avoid the environmental deterioration. Rapidly depleting mineral and energy sources around the world forced us to consider the wastes as resources and not as wastes anymore. Therefore, a multidimensional approach is required to manage the generated solid waste and problem of climate change. In order to share the most updated and advanced knowledge from all over the world, the **International Conference on Solid Waste 2013: Innovation in Technology and Management** conference will deliberate on various issues related to Innovation in waste treatment technologies and waste management strategies with the purpose to combat climate change from the waste perspectives. It will definitely enhance our understanding of waste management and treatment options that result in effective and competent solution through the interaction among the professionals, academics, researchers and the policy makers for sustainable future waste management policy and tackling global climate change problems.

Themes:

The conference covers the following areas:

1. Sustainable solid waste management - trend and development
2. Waste management policies and strategies
3. Waste separation and collection
4. Waste recycling technology
5. Life cycle of waste: from separation to recycling
6. Emerging technologies for waste treatment
7. Innovative development in waste to energy
8. Advance in biological waste treatment technology
9. Waste management for combating climate change
10. Clinical and industrial waste management
11. Construction waste management
12. Community and industrial engagement in waste management
13. Business opportunities and future development in waste industries
14. Clean development mechanism for waste management
15. Waste management in developing countries

Conference Secretariat:

Sino-Forest Applied Research Centre for
Pearl River Delta Environment (ARCPE)
Hong Kong Baptist University
David C. Lam Building DLB 517, Kowloon Tong, Hong Kong
Tel: (852) 34112089
Fax: (852) 34112095
Email: icswhk@hkbu.edu.hk
URL: <http://arcpe.hkbu.edu.hk/conf2013>



IGS-Incheon 2013 - 5th International Symposium on Geotechnical Engineering, Disaster Prevention and Reduction, and Environmentally Sustainable Development, May 15-17 May 2013, Incheon, South Korea, [www.geochina-cces.cn/download/2013 5th Dsiaster prevention Bulletin 1.pdf](http://www.geochina-cces.cn/download/2013%205th%20Disaster%20prevention%20Bulletin%201.pdf)

HF2013 Effective and Sustainable Hydraulic Fracturing - an ISRM Specialized Conference, 20-22 May 2013, Brisbane, Queensland, Australia, <http://www.csiro.au/events/HF2013>

Experimental Micromechanics for Geomaterials Joint workshop of the ISSMGE TC101-TC105, 23 - 24 May 2013, Hong Kong, owlam@hku.hk

18th SouthEast Asian Geotechnical & Inaugural AGSSEA Conference, 29 - 31 May 2013, Singapore, www.18seagc.com



**Second International Symposium on
Geotechnical Engineering for the Preservation
of Monuments and Historic Sites
29 -31 May 2013, Napoli, Italy
www.tc301-napoli.org**

The conservation of monuments and historic sites is one of the most challenging problems facing modern civilization. It involves a number of factors belonging to different fields (cultural, humanistic, social, technical, economical, administrative), intertwining in inextricable patterns. In particular, the requirements of safety and use appear (and often actually are) in conflict with the respect of the integrity of the monuments. In almost all countries of the world the conservation is looked after by an official trained in Art History or Archaeology. He has generally the control of any action to be undertaken, and imposes constraints and limitations that sometimes appear unreasonable to the engineer. The engineer, in turn, tends to achieve safety by means of solutions which appear unacceptable to the official in charge of conservation, sometimes mechanically applying procedures and regulations conceived for new structures. It is evident that some equilibrium has to be found between the safe fruition of a monument and the respect of its integrity. The former task belongs to the know-how of any well trained and experienced engineer, while the latter one is more difficult, being the same concept of integrity rather elusive.

The difficulty of the problem is increased by the lack of a general theory, universally accepted and guiding the behaviour of the actors involved as the Mechanics does with the structural engineer. The possibility of finding in practice an acceptable equilibrium is linked to the development of a shared culture. The International Society of Soil Mechanics and Geotechnical Engineering contributed to this development by an ad hoc Committee (TC 19 - Conservation of Monuments and Historic Sites), that has been promoted over 25 years ago by French and Italian engineers (Jean Kerisel, Arrigo Croce). A number of international and regional symposia have been organised, always with large audience and lively discussions. A Lecture dedicated to Jean Kerisel will be given for the first time at the next International Conference on Soil Mechanics and Geotechnical Engineering to be held in 2013 in Paris. In this framework, the Technical Committee (now TC301) is organising the 2nd International Symposium on Geotechnical Engineering for the Preservation of Monuments and Historic Sites,

which will be held in Napoli on May 2013. Its aim is that of comparing experiences, presenting important achievements and new ideas, establishing fruitful links.

The contributions to the Conference should focus on the following main themes:

1. Geotechnical aspects of historic sites, monuments and cities;
2. Past design criteria and traditional construction methods;
3. Techniques to preserve ancient sites and constructions;
4. Rehabilitation of heritage;
5. Role of geotechnical engineering in preservation of cultural and historical integrity.

Scientific secretariat

For general queries please contact:

info@tc301-napoli.org

For queries about paper submission please contact:

secretariat@tc301-napoli.org

or

Stefania Lirer (phone: +39 081 76 85915; email:

stelirer@unina.it)

Emilio Bilotta (phone: +39 081 76 83469; email:

emilio.bilotta@unina.it)



WTC 2013 ITA-AITES World Tunnel Congress and 39th General Assembly "Underground – the way to the future", Geneva, Switzerland, May 31 to June 7, 2013.
www.wtc2013.ch



**The first international conference on
Foundation and Soft Ground Engineering
Challenges in Mekong Delta
5-6 June 2013, Binh Duong New City, Vietnam**
www.ictdmu.com

Dear Colleagues,

We are very pleased to announce that the first International Conference on Foundation and Soft Ground Engineering Challenges in Mekong Delta will be held from 5-6 June 2013 in Binh Duong New City -Vietnam. The aim of this conference is to bring together researchers, scientists, engineers and practitioners in order to find out the optimum geotechnical solutions for preserving the cultivated area and constructing infrastructure of Vietnam's Mekong Delta under climate change.

The Vietnamese Mekong Delta is the lowest part of the Mekong River with the average elevation of less than one meter. This delta has been formed since Tertiary and is currently covered by Holocene deposit transported by Mekong River after the last glacier. It has suffered flooding and salt intrusion for long periods of time. This is the most vulnerable flooding region in the Mekong River system. In 2000, whole Vietnamese Mekong Delta seems to have been immersed in water by seasonal flooding and Sea Level Rise as shown in Figure below.

Indeed, it is a great challenge for the Vietnamese Geotechnical Engineers in confronting Sea Level Rise on Mekong Delta. Therefore, finding out the optimum geotechnical solutions to preserve the cultivated area and construct infrastructure in this area will play a vital role in the sustainable development of Vietnam. We are pleased to invite you to submit papers and attend this conference.

Topics

1. Analysis
2. Design
3. Construction & equipment
4. Ground improvement
5. Instrumentation
6. Load tests
7. Case histories
8. Design codes
9. Regulations
10. Other technological/practical innovations

On behalf of the organizing committee, I am looking forward to welcoming you in Binh Duong New City.

Dr. Nguyen Ke Tuong
Dean of Civil Engineering Faculty
THU DAU MOT UNIVERSITY
06 Tran Van On Street, Binh Duong, Vietnam
Mobile: 84-989.035.649
Tel. 84-650-3.822.518
Fax: 84-650-3.837.150
Website: www.tdmu.edu.vn



First International Conference on Rock Dynamics and Applications (RocDyn-1), 6-8 June 2013, Lausanne, Switzerland,
www.rocdyn.org



The micro- and nano-modification of infrastructure materials and the associated multi-scale characterization and simulation has the potential to open up whole new uses and classes of materials, with wide-ranging implications for society. The use of multi-scale characterization and simulation brings the ability to target changes at the very small scale that predictably effect the bulk behavior of the material and thus allowing for the optimization of material behavior and performance. This conference brings together key researchers from around the world for presenting their findings in a focused symposium environment.

The objective of the symposium is to provide a forum for researchers to present their recent achievements in multi-scale characterization, modeling and simulation of construction materials. The conference includes, but is not limited to, the following topics:

- Multi-scale microstructure characterization,
- Multi-scale microstructure visualization,
- Multi-scale microstructure representation,
- Physico-chemical, chemo-mechanical and mechanical processes,
- Analytical and numerical modeling methods,
- Homogenization approach, numerical modeling methods,
- Large scale computational simulation,
- Inverse method,
- Integrated modeling, simulation and validation,
- Interface properties
- Methodology unification

This conference is organized under the auspices of the [RILEM technical committee 231-NBM: Nano-Technology Based Bituminous Materials](#) and the [TRB AFK-20 committee: Characteristics of Asphalt Materials](#).

ORGANIZERS

Highway and Railway Engineering
KTH Royal Institute of Technology
Brinnellvagen 23
SE-100 44 Stockholm
Sweden

T +46 (0)8 790 87 17
F +46 (0)8 411 84 32
info@rilem2013.org



**4th International Conference on
Computational Dynamics & Earthquake Engineering
12 – 14 June 2013, Kos Island, Greece**
<http://compdyn2013.org>

COMPDYN 2013 is one of the Thematic Conferences of the **European Community on Computational Methods in Applied Sciences (ECCOMAS)** and a Special Interest Conference of the **International Association for Computational Mechanics (IACM)**. It has also been promoted by the European Committee on Computational Solids and Structural Mechanics (ECCSM) of ECCOMAS.

The previous meetings of COMPDYN were held in Rethymno, Crete (2007), in Rhodes (2009) and in Corfu (2011) and attracted 1.200 participants in total.

The increasing necessity to solve complex problems in Structural Dynamics and Earthquake Engineering requires the development of new ideas and innovative methods for providing accurate numerical solutions in affordable computing times.

The purpose of this Conference series is to bring together the scientific communities of Computational Mechanics, Structural Dynamics and Earthquake Engineering in an

effort to facilitate the exchange of ideas in topics of mutual interest and to serve as a platform for establishing links between research groups with complementary activities. The communities of Structural Dynamics and Earthquake Engineering will benefit from this interaction, acquainting them with advanced computational methods and software tools which can highly assist in tackling complex problems in dynamic/seismic analysis and design, while also giving the Computational Mechanics community the opportunity to become more familiar with very important application areas of great social impact.

Sessions related to specific topics of the Conference will be introduced by Keynote Lectures which will be complemented by invited Minisymposia, organized by recognized experts in research areas of current interest, as well as by contributed papers.

The conference topics include (the list is indicative):

- Numerical simulation methods for dynamic problems
- Nonlinear dynamics
- Soil dynamics
- Geotechnical earthquake engineering
- Soil-structure interaction
- Dynamics of coupled problems
- Performance-based earthquake engineering
- Solution strategies for dynamic equations
- Soft computing applications
- Optimum design in structural dynamics and earthquake engineering
- Parallel and distributed computing – Cloud computing, GPGPU Computing environment
- Dynamics of micro and macro systems
- Impact dynamics
- Multi-scale dynamics
- Stochastic dynamics
- Reliability of dynamic systems
- Seismic risk and reliability analysis
- Constitutive modelling under earthquake loading
- Seismic isolation
- Repair and retrofit of structures
- Structural acoustics and vibro-acoustics
- Sound and vibration
- Aeroelasticity
- Wave propagation
- Algorithms for structural health monitoring
- Inverse problems in structural dynamics

Secretariat

Institute of Structural Analysis and Antiseismic Research
National Technical University of Athens
Zografou Campus, Athens 15780, Greece
Tel.: +30 210 7723450
Fax: +30 210 7721693
e-mail: info@compdyn2013.org
URL: <http://www.compdyn2013.org>



Strait Crossing Norway 2013 : Extreme Crossings and New Technologies, 16-19 June 2013, Bergen, Norway
www.sc2013.no



ICEGECHP 2013
International Conference on
Earthquake Geotechnical Engineering
From Case History to Practice
17 - 19 June 2013, Istanbul, Turkey

On the Behalf of ISSMGE Technical Committee (TC 203) on "Earthquake Geotechnical Engineering and Associated Problems" we take great pleasure in inviting you to the International Conference on Earthquake Geotechnical Engineering From Case History to Practice in the honour of Prof. Kenji Ishihara to be organized in Istanbul, Turkey during 17-19 June, 2013. The Conference Venue and the registration fee and other related information will be announced shortly!



SINOROCK 2013 Rock Characterization, Modelling and Engineering Design Methods, an ISRM Specialized Conference, 18-20 June 2013, Shanghai, China, www.sinorock2013.org

STREMAH 2013 13th International Conference on Studies, Repairs and Maintenance of Heritage Architecture, 25 - 27 June 2013, New Forest, UK, carlos@wessex.ac.uk



6th International Conference
SDIMI 2013 - Sustainable Development in the
Minerals Industry
30 June - 3 July 2013, Milos Island, Greece
<http://sdimi2013.conferences.gr>

The objective of this Conference is to assist the minerals industries in their global transition to sustainable development.

At present, the focus of public perception is placed on environmental and social consequences of mining. Growing environmental and social concerns, supply chain procurement standards, as well as public pressure and regulatory measures, will profoundly shape the global mineral business in the near future.

In order to cope with these challenges, the minerals community must integrate sustainable development concepts, best-practices and stakeholders participation into the technical considerations, business strategies and performance goals that are associated with all facets of mineral exploitation, from exploration to mine closure.

The main theme of the meeting, therefore, is the development, monitoring and assessment of sustainable development criteria for mineral operations.

The Conference also aims to conclude with a consensus plan and a process, representing a variety of stakeholders, which can provide guidance and direction to the minerals community on the path to sustainable development.

The conference will address all sustainability issues related to the minerals industry. Emphasis will be given to the following topics:

- Best practices and sustainable mining practices
- Life cycle assessment
- Sustainable land use and raw materials supply issues
- Mineral resources policy
- Social contributions and environmental performance
- Sustainability in Minerals Education
- Certification, Evaluation and Auditing
- Emerging economies
- Nature conservation and climate change
- Risk management
- Health and safety
- Sustainability reporting
- Sustainability in oil and gas development
- Technological developments
- Local communities and good governance
- Capacity building & human resources

Conference Secretariat:

Heliotopos-Conferences

Address: Imerovigli, GR-84700, Santorini, Greece

Phone: +30 2286024758

Fax: +30 2286023672

Conference Secretariat E-mail: sdimi2013@heliotopos.net



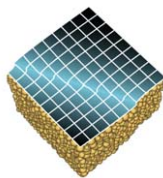
TC215 ISSMGE - International Symposium on Coupled Phenomena in Environmental Geotechnics (CPEG) - "From theoretical and experimental research to practical applications", 1 - 3 July 2013, Torino, Italy, www.tc215-cpeg-torino.org

BIOT-5 5th Biot Conference on Poromechanics, 10-12 July 2013, Vienna, Austria, <http://biot2013.conf.tuwien.ac.at>

ICEPR 2013 3rd International Conference on Environmental Pollution and Remediation, July 15-17 2013, Toronto, Ontario, Canada, <http://icepr2013.international-aset.com>

The 6th International Symposium on Rock Stress, 20-22 August 2013, Sendai, Japan, <http://www2.kankyo.tohoku.ac.jp/rs2013>





**The Third International Symposium on
Computational Geomechanics (ComGeo III)**
Krakow, Poland, 21-23 August, 2013
www.ic2e.org/index.php/comgeo/comgeo-iii

The main objective of the Symposium is to provide a forum for engineers, researchers and students to exchange views and present their most recent contributions in the area of computational geomechanics. The scope of the Symposium is broad and significant contributions on advances in numerical analysis of geotechnical structures such as earth and rock fill dams, slopes, tunnels and underground caverns, as well as foundations for wind and wave energy harvesting structures, are welcome. Papers on computational engineering geology and geophysics related to issues in petroleum, mining, CO₂ and nuclear waste storage and offshore engineering are also welcome. Contributions on multiscale constitutive modelling as well as hydro-mechanical-thermal coupling in saturated and unsaturated geomaterials are also of relevance.

The Symposium will include invited theme lectures presented by distinguished researchers and engineers from the field of computational geomechanics. These will be complemented by presentations given by the Symposium participants. The number of contributions will be restricted to 120. Ample time will be provided for formal and informal discussions.

Correspondence

Prof. Gyan N. Pande
Center for Civil and Computational Engineering,
Talbot Building, Swansea University,
Singleton Park, Swansea SA2 8PP, Wales, UK.
Tel: +44 (0) 1792295253, E-mail: g.n.pande@swansea.ac.uk

or

Prof. Stan Pietruszczak
Department of Civil Engineering,
McMaster University, Hamilton,
Ontario, Canada L8S 4L7.
Tel: +1 905-525-9140 ext. 24007,
E-mail: pietrusz@mcmaster.ca



5th International Young Geotechnical Engineers' Conference (5iYGEC'13), 31 August - 01 September 2013, Paris, France
<http://www.lepublicsystemepco.com/EN/events.php?IDManif=696&IDModule=21&PPAGE=&PAGE=&TEMPLATE=&CSS=&IDRub>

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

13th International Conference of the Geological Society of Greece, September 5-8 2013, Chania, Greece,
www.egc13.gr

Géotechnique Symposium in Print on Bio- and Chemo-Mechanical Processes in Geotechnical Engineering,
www.elabs10.com/content/2010001471/SIP%202013.pdf

EUROCK 2013 ISRM European Regional Symposium
"Rock Mechanics for Resources, Energy and Environment",
21-26 September 2013, Wroclaw, Poland
www.eurock2013.pwr.wroc.pl



www.sardiniasymposium.it

The Sardinia Symposia are proud to be celebrating their Silver Anniversary, having been established 25 years ago and having rapidly become the Reference Forum in the field of Waste Management for the international community, where state of the art concepts, strategies and technologies are presented and experiences shared by leading scientists, administrators and practitioners. The Symposia favoured the development of innovation in the field; all new ideas and approaches applied worldwide in the last two decades were thoroughly debated and reviewed during the numerous workshop sessions in the Symposia, some of them purposely organized in cooperation with the IWWG task groups.

The thirteenth Symposium was held in October 2011 in the traditional venue of the Forte Village Resort at S. Margherita di Pula (Cagliari, Italy), with an attendance of nearly 800 delegates from 63 different countries. The 2013 edition of the Symposium will focus as per tradition on the advances of Waste Management science and technology, presenting case studies and discussing the main controversial subjects, sharing experiences among different countries, valuating social and economical balances.

The Symposium will include oral presentations, poster sessions, specialized sessions and specific workshops. Before the start of the Symposium, training courses will be offered by IWWG.

THEMES

A. Waste policy and legislation

International, national and regional guidelines; regulation and planning requirements; role of scientific and technical organizations; carbon tax.

B. Waste management strategies

Integrated waste management; national strategies; future perspectives, waste as a resource; public and private partnership.

C. Public concern and education

Public involvement and relationship; NGO's activities; mediation; education; communication; training in waste management and operation.

D. Waste management assessment and decision tools

Life cycle analysis; risk assessment; environmental impact assessment; EMAS; quality control procedures; cost benefit analysis; multicriteria analysis; auditing; BAT-Best Available Technologies.

E. Waste characterization

Standardization; analytical procedures, sampling, production variations vs time and geographical areas.

F. Waste collection

Cost optimization; collection on demand; separate collection; case studies; subsurface systems; pneumatic collection; ergonomics of waste collection.

G. Waste minimisation and recycling

Waste avoidance; waste logistics and recycling; new recycling technologies; material quality after recycling; packaging material; electronic waste; construction and demolition waste; batteries; end of life vehicle; market waste.

H. Biological treatment

New developments in composting and anaerobic digestion; emissions from processing facilities; product quality; degradation and fate of emerging pollutants during biological treatment; biological treatment of special biowaste; challenges in using microbiology knowledge to explain biological process; assessment of indicators for evaluating product quality and humification.

I. Thermal treatment

Technologies and experiences; new technologies; production and use of RDF; emission control; treatment of residues; beneficial use of combustion ash.

L. Mechanical biological treatment prior to landfilling

Mechanical pretreatment (separation, shredding, RDF-production, etc.); technology and experience; new technology, testing and landfill acceptance; off gas treatment; emission control.

M. Sanitary landfilling

Sustainable landfill concepts for mechanically biologically pretreated municipal waste and special waste; processes and emissions; leachate and gas management; landfill design and construction; barrier design and performance; technologies for mitigation of landfill gas emission; waste mechanics; landfill operation; administrative and financial aspects; landfilling under specific conditions (tropics, islands, mountains, etc.); aftercare and reuse; waste disposal as final sinks for harmful substances; landfill remediation; case studies.

N. Integrated wastewater and solid waste management

Decentralized systems; closed substance cycles; future perspectives; cases.

O. Waste management and climate change

Minimisation of greenhouse gases from waste management activities and landfills, waste - CDM projects, minimisation of energy consumption, landfills as geological sinks for carbon and other elements.

P. Waste management in developing and low income countries

Appropriate technologies, experiences, international cooperation, financing, education.

Q. Special sessions

BAT - Best Available Technologies; IPPC regulations; fate of nanomaterials during waste management.

For any enquiries and information on registration, accommodation, etc., please contact the Organising Secretariat:

Cinzia MAMBERTI, *General Manager*

info@eurowaste.it

Adelia PRESUTTI, *Paper-related enquiries*

papers@sardiniasymposium.it



International Conference and Exhibition Promoting the Versatile Role of Hydro 7 to 9 October 2013, Innsbruck, Austria

https://www.hydropower-dams.com/hydro-2013.php?c_id=88

According to the International Energy Agency, hydro capacity worldwide could double, to almost 2000 GW, by 2050.

Pumped-storage capacity is to increase by a factor of 3 to 5, especially in Europe, Asia and North America.

The African Union is encouraging the implementation of major new hydro projects and encouraging cross-border energy markets, which will harness more of the enormous potential of that region, and enhance socio-economic development in some of the poorest parts of the world.

Full support of the IFIs, development agencies, professional associations and national governments is now firmly behind hydropower, with widespread recognition of the multiple benefits that carefully planned projects can bring.

It is timely for the world hydropower community to be meeting next year in Austria, one of the pioneering countries of Europe for large and small hydro development. The country has much valuable experience to share, an active programme of development under way, a vigorous hydropower industry, and national and regional utilities firmly committed to hydro and pumped-storage.

If you are active in any aspect of the hydro profession, join us in Innsbruck for three days of constructive discussions, and play a role in world hydropower development.

Main Themes

- Potential and development opportunities
 - National plans and potential
 - Planning tools
 - Integrated regional development
 - Opportunities for cross-border trading
 - Policies and targets: are they always realistic
- Project financing
 - New approaches and experience
 - Co-financing
 - Public-private partnerships
 - Risk allocation and management
 - Legal and institutional aspects
- Commercial and economic aspects
 - Economic analysis
 - Legal and regulatory aspects
 - Contractual issues
 - The CDM process: how is hydro performing
 - Concession arrangements
 - Quantifying the value of hydro's ancillary services
- Planning
 - System planning
 - New developments in software

Powerplant planning

- Concession arrangements

Role of public and private sectors
Alternative concession models
Procuring a concession partner
Securing value for hydro resources

- Modelling

Hydraulic modelling of dams and spillways
Machinery efficiency
Reservoir operation
Modelling for upgrade schemes

- Environmental and social aspects

Impact assessment and mitigation
Residual and cumulative impacts
Success stories and challenges
Carbon emissions: research update
Fish protection: innovative technology
Stakeholder consultations
Benefit sharing

- Hydrology

Adaptation to climate change
Flood mitigation and management
Spillway design

- Hydraulic machinery

Research and innovation
Equipment design and manufacture
Environment-friendly design
Operational issues
Abrasion protection
Enhancing efficiency

- Electrical engineering

Generator design
Condition monitoring
Grid management
Smart grid technology

- Hydro in synergy with other renewables

Integrated developments:
hydro/solar, hydro/wind
Back-up systems for intermittent sources
Grid optimization and management

- The role and benefits of pumped storage

Role in the grid and ancillary benefits
Grid stability and dynamic power regulation of units
Technical innovation
Instructive case studies

- System management

Optimizing reservoir operation
Software developments
Operation and maintenance

- Small hydro development

Assessing and developing SHP potential
Innovative approaches to SHP
Appropriate technology for rural electrification

- Developments in marine energy

Tidal and wave power potential and research
Research, development and innovation
Case studies/operating experience
In-stream/ultra low head systems

- Upgrading and refurbishment

Economic aspects

Upgrading of equipment and civil works
Retrofitting hydro and pumped storage units
Enhancing environmental aspects

- Communications and capacity building

Improving communications/public relations
Historical hydro: preserving cultural heritage
Aesthetics of dams and hydro
Inspiring the next generation of engineers
Closing the knowledge gap

- Civil engineering

Dams for multipurpose developments
Innovations in dam design
Construction materials
Spillway design and operation
Tunnels and underground works
Assessing risk and designing for safety

- Hydro project management

Site supervision
Challenging site conditions
On-site safety of personnel

- Sedimentation management

Advanced planning to avoid sedimentation
Design case studies
Sediment measurement techniques
Sediment removal options

HYDRO2013

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



VAJONT 2013 - International Conference Vajont, 1963 – 2013 Thoughts and Analyses after 50 years since the catastrophic landslide, 8-10 October, 2013, Padova, Italy, <http://www.vajont2013.info/vajont-pd>

International Symposium on Design and Practice of Geosynthetic-Reinforced Soil Structures, 14-16 October, 2013, Bologna, Italy, www.civil.columbia.edu/bologna2013



International Conference Geotechnics in Belarus: Science and Practice 23-25 October 2013, Minsk, Belarus

The organizing committee invites you to take part in the International Conference Geotechnics in Belarus: science and practice dedicated to 60th anniversary Department for Geotechnics and Ecology in Construction and to 90th anniversary of Professor Yuri A. Sobolevski. Dr. Sc., Professor Juri A. Sobolevski (1923 – 2002) is the founder of the Bela-

rus national school of geotechnics. He was one of organizers the Department for Bases, Foundations and Engineering Geology of the Byelorussian Polytechnic Institute, being its permanent Head from 1965 till 1993. Scientific inheritance of Professor Juri Sobolevski reflect his encyclopedic knowledge and research interests. The brightest of them were dedicated to fundamental problems of Soil Mechanics as evaluation of filtration forces in stability of soil masses, land reclamation, construction in complicated soil conditions, environmental geotechnics. Under the leadership of professor Juri Sobolevski Department for Bases, Foundations and Engineering Geology (now Geotechnics and Ecology in Construction) was recognized as research and educational center of international level. Department carried out the widest range of practical problems solutions for land reclamation, tunneling, underground constructions, landslides, hydro-technical engineering.

Civil position of Professor Juri Sobolevski was always active and patriotic. During occupation of Belarus during World War II he led a clandestine partizan organization. The in regular Army he reached Berlin. Prof. Sobolevski was nominated with numerous state awards and street in his hometown Globokae was named in his honour.

Subjects of conference

Section №1. Engineering researches and geotechnical monitoring.

Section №2. Soil mechanics as a theoretical basis of modern geotechnics.

Section №3. Design and technology of installation of foundations in complicated geotechnical conditions. Strengthening and reconstruction of the foundations.

Section №4. Regulatory and technical support for design and construction of the foundations.

Contact person:

Ulasik T., Sernov V., Ignatov S.
Republic of Belarus, prospectus Nezavimosti, building 65,
220013, Minsk, Belarus
Phone: +37517 2659769
E-mail: geotechnika2013@gmail.com belgeotech@tut.by



November 13-15, Nagoya, Japan
www.geomat-e.com

The Third International Conference on Geotechnique, Construction Materials and Environment GEOMATE 2013 will be organized in Nagoya on Nov. 13-15, 2013 in conjunction with Nagoya Institute of Technology, GEOMATE International Society, Japanese Geotechnical Society, AOI-Engineering, Useful Plant Spread Society, HOJUN and Glorious International. It aims to provide with great opportunities to share common interests on geo-engineering, construction

materials, environmental issues, water resources, and earthquake and tsunami disasters.

On Friday 11 March at 14:46, 2011 Japan Standard Time, the north east of Japan was severely damaged by the tragic earthquake and tsunami. The conference will be dedicated to the tragic Tohoku-Kanto earthquake and tsunami disasters.

This is the 3rd event after the first and second international conferences that were successfully held in Tsu city, Mie, Japan and Kuala Lumpur, Malaysia with more than 150 participants in each event. The organizers encourage and welcome enthusiastic participation and look forward to receiving contributions with in-depth multidisciplinary technologies towards new research and developments.

Conference themes will consider papers in the following topics:

- Advances in Composite Materials
- Computational Mechanics
- Foundation and Retaining Walls
- Slope Stability
- Soil Dynamics
- Soil-Structure Interaction
- Pavement Technology
- Tunnels and Anchors
- Site Investigation and Rehabilitation
- Ecology and Land Development
- Water Resources Planning
- Environmental Management
- Public Health and Rehabilitation
- Earthquake and Tsunami Issues
- Safety and Reliability
- Geo-Hazard Mitigation
- Case History and Practical Experience
- Others

Conference Secretariat:

Dr. H.M. Shahin, Secretary, A/Prof. NIT, Japan
Dr. Zakaria Hossain, General Secretary, A/Prof. MU, Japan
Mr. Musahq Ali, Assistant Secretary
Division of Environmental Science and Technology
Graduate School of Bioresources
Mie University, 1577 Kurima Machiya-cho
Tsu-city, Mie 514-8507, Japan
E-mail: geomate@qi-j.com
Tel+Fax: +81-59-231-9578



10th International Symposium of Structures, Geotechnics and Construction Materials, 26-29 November 2013, Santa Clara, Cuba, ana@uclv.edu.cu, quevedo@uclv.edu.cu



Hanoi, Vietnam
www.geotechn2013.vn

In October 2011, the first international conference on Geotechnics for Sustainable Development, GEOTEC HANOI 2011 was organized in Hanoi. The conference was excellently successful, with about 450 attendees from 24 countries. Among the conference highlights were the six keynote-lectures given by Prof. **Sven Hansbo** from Sweden, Prof. **Kenji Ishihara** and Dr. **Hiroshi Yoshida** from Japan, Prof. **Harry G. Poulos** from Australia, Prof. **Pieter A. Vermeer** from the Netherlands, Prof. **Alain Guilloux** from France. The conference proceeding with 110 papers was edited and printed with a high international quality.

Continuing the success of the first event, this conference is decided to be held every second year in Hanoi. The second conference GEOTEC HANOI 2013 is organised by FECON-Foundation Engineering & Underground Construction JSC, Vietnamese Society for Soil Mechanics and Geotechnical Engineering VSSMGE, and Asian Institute of Technology AIT, and will be held on 28th and 29th November 2013 in Melia Hotel, Hanoi.

CONFERENCE THEMES

1. Foundation for high-rise buildings
2. Underground projects in soft soil
3. Soil improvement and reinforcement for infrastructure projects
4. Monitoring and instrumentation for tunnels and excavations
5. Geotechnical modeling and numerical analysis

Contact person: Dr. Le Quang Hanh, Ms Vu Thuy Dung
FECON Foundation Engineering & Underground Construction JSC., 15F, CEO Building, HH2-1 Plot, Pham Hung Road, Tu Liem District, Hanoi, Vietnam
Phone: (+ 84) 46.269.0481 or 46.269.0482, Ext: 335
Fax: (+ 84) 46.269.0484
E-mail: secretariat@geotechn2013.vn
Website: <http://www.geotechn2013.vn>



tions on all aspects of foundation engineering that advance our state of art/practice case histories, particularly innovations in practice and technology, are most welcomed. This symposium is held in conjunction with the Sixth Annual General Meeting of the Geotechnical Society of Singapore (GeoSS).

Topics

1. Analysis
2. Design
3. Construction & equipment
4. Ground improvement
5. Instrumentation
6. Load tests
7. Quality control
8. Design codes
9. Risk management
10. Regulations
11. Novel/special foundations
12. Case histories
13. Information technology
14. Other technological/practical innovations

Conference Secretariat
Office of Professional Engineering & Executive Education, (OPE³)
Faculty of Engineering
National University of Singapore
3 Engineering Drive 2, Blk E1 #05-15
Singapore 117578
Tel : (65) 6516 5113; Fax : (65) 6874 5097
E-mail: isafe2013@nus.edu.sg



8th International Conference Physical Modelling in Geotechnics 2014, 14-17 January 2014, Perth, Australia, <http://icpmg2014.com.au>

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

World Tunnel Congress 2014 and 40th ITA General Assembly "Tunnels for a better living", 9 - 15 May 2014, Iguassu Falls, Brazil, www.wtc2014.com.br



ISAP2013
International Symposium on
Advances in Foundation Engineering
5 -6 December 2013, Singapore
<http://rpsonline.com.sg/isafe2013/>

The purpose of this international symposium is to gather designers, consultants, contractors, regulators, researchers and other stakeholders together in a single forum to address all aspects of foundation engineering, including present state of art/practice and challenging issues facing the foundation engineering profession. The basic goal is to share information on how to do the job most effectively with lowest risk and impact on the environment. Contribu-



EUROCK 2014
ISRM European Regional Symposium
Rock Engineering and Rock Mechanics:
Structures in and on Rock Masses
26-28 May 2014, Vigo, Spain

Contact Person: Prof. Leandro Alejano
ETSI MINAS - University of Vigo
Dept. of Natural Resources & Environmental Engineering
Campus
Lagoas Marcosende
36310 Vigo (Pontevedra), SPAIN
Telephone: (+34) 986 81 23 74
E-mail: alejano@uvigo.es



8th European Conference "Numerical Methods in Geotechnical Engineering" NUMGE14, Delft, The Netherlands, 17-20 juni 2014, www.numge2014.org

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

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

IAEG XII CONGRESS Torino 2014 Engineering Geology for Society and Territory, IAEG 50th Anniversary, September 15-18, 2014, Torino, Italy, www.iaeg2014.com

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

ARMS 8 - 8th ISRM Rock Mechanics Symposium, 14-16 October 2014, Sapporo, Japan
www.rocknet-japan.org/ARMS8/index.htm



**13th ISRM International Congress on Rock Mechanics
Innovations in Applied and Theoretical
Rock Mechanics
10 - 13 May 2015, Montreal, Canada**

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

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



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

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



XVI ECSMGE 2015

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

The British Geotechnical Association (BGA) is pleased to announce that it will be hosting the 16th European Conference on Soil Mechanics and Geotechnical Engineering at the Edinburgh International Conference Centre from 13th to 17th September 2015. The conference was awarded by a meeting of the European Member Societies on 13th September 2011 at the 15th European Conference on Soil Mechanics and Geotechnical Engineering in Athens, Greece.

You can view the BGA bid document at the following link:
<http://files.marketingedinburgh.org/bid/ECSMGEELECTRONICBID.pdf>

The conference website will be updated regularly as arrangements for the conference progress. Please bookmark it and visit regularly.

We look forward to welcoming you all in Edinburgh, one of Europe's truly great cities, in September 2015.

Dr Mike Winter
Chair of the Organising Committee
mwinter@trl.co.uk



EUROCK 2015
ISRM European Regional Symposium
64th Geomechanics Colloquy
7 – 9 October 2015, Salzburg, Austria



NGM 2016
The Nordic Geotechnical Meeting
25 - 28 May 2016, Reykjavik, Iceland

The aim of the conference is to strengthen the relationships between practicing engineers, researchers, and scientists in the Nordic region within the fields of geotechnics and engineering geology.

All are invited to share their experience and knowledge with their Nordic colleagues.

Contact person: Haraldur Sigursteinsson
Address: Vegagerdin, Borgartún 7, IS-109, Reykjavik, Iceland
Phone: +354 522 1236
Fax: +354 522 1259
E-mail: has@vegagerdin.is

Highway tunnel ceiling slabs fall in Japan, kill 9



Japanese officials ordered the immediate inspection of tunnels across the country Monday after nine people were killed when concrete ceiling slabs fell from the roof of a highway tunnel onto moving vehicles below.

Those killed in Sunday's accident were traveling in three vehicles in the 4.7-kilometer (3-mile) long Sasago Tunnel about 80 kilometers (50 miles) west of Tokyo. The tunnel, on a highway that links the capital to central Japan, opened in 1977 and is one of many in the mountainous country.

The transport ministry ordered that inspections be carried out immediately on 49 other tunnels around the country that are either on highways or roads managed by the central government and of similar construction.

Police and the highway operator Central Japan Expressway Co. were investigating why the concrete slabs in the Sasago Tunnel collapsed. An inspection of the tunnel's roof in September found nothing amiss, according to Satoshi Noguchi, a company official.

An estimated 270 concrete slabs, each weighing 1.4 metric tons (1.54 short tons), suspended from the arched roof of the tunnel fell over a stretch of about 110 meters (120 yards), Noguchi said.

The operator was exploring the possibility that bolts holding a metal piece suspending the panels above the road had become aged, he said. The panels, measuring about 5 meters (16 feet) by 1.2 meters (4 feet), and 8 centimeters (3 inches) thick, were installed when the tunnel was constructed in 1977.

Company President and CEO Takekazu Kaneko said that the company was inspecting other tunnels of similar structure, including a parallel tunnel for traffic going in the opposite direction. Both sections of the highway were shut down indefinitely.

Recovery work at the tunnel was suspended Monday while the roof was being reinforced to prevent more collapses, said Jun Goto, an official at the Fire and Disaster Management Agency

Yoshihiro Seto, an officer with the Yamanashi prefectural police, said they can't rule out that there are more bodies or survivors in the tunnel, but the possibility is low. Goto said they hope to resume recovery work on Tuesday.

Two people suffered injuries in the collapse.

(Malcolm Foster / APShare, December 3, 2012

<http://www.usatoday.com/story/news/world/2012/12/03/japan-tunnel-collapse/1742031>)



Greater consideration of liquefaction risks urged by Christchurch report

Land development rules in Christchurch, New Zealand failed to take account of liquefaction risks, according to a new report published this week.

The final report from the Canterbury Earthquakes Royal Commission into the effects of the earthquakes in 2010 and 2011 said that too many buildings had to be demolished due to liquefaction damage.

The report called for better provision for the acknowledgement of earthquake and liquefaction risk in the various planning instruments that are made under the Resource Management Act 1991. The commission said that the Resource Management Act 1991 should more explicitly acknowledge the potential effects of earthquakes and liquefaction.

The report stated: "One way of minimising the failure of buildings in the future is to ensure that the land on which they are developed is suitable for the purpose. Having said that, we need to emphasise that it is not possible to predict with any certainty when an earthquake will occur and, in reality, the public and private investment in the country's cities is such that it is not realistic to redirect development from the existing central business districts."

Risks of liquefaction and lateral spread should be considered when zoning for new development areas is being planned in order to minimise the effects of future earthquakes.

Recommendations

- Sections 6 and 7 of the Resource Management Act 1991 should be amended to ensure that regional and district plans (including the zoning of new areas for urban development) are prepared on a basis that acknowledges the potential effects of earthquakes and liquefaction, and to ensure that those risks are considered in the processing of resource and subdivision consents under the Act.
- Regional councils and territorial authorities should ensure that they are adequately informed about the seismicity of their regions and districts. Since seismicity should be considered and understood at a regional level, regional councils should take a lead role in this respect, and provide policy guidance as to where and how liquefaction risk ought to be avoided or mitigated. In Auckland, the Auckland Council should perform these functions.
- Applicants for resource and subdivision consents should be required to undertake such geotechnical investigations as may be appropriate to identify the potential for liquefaction risk, lateral spreading or other soil conditions that may contribute to building failure in a significant earth-

quake. Where appropriate, resource and subdivision consents should be subject to conditions requiring land improvement to mitigate these risks.

(Claire Symes / New Civil Engineer, 14 December, 2012, <http://www.nce.co.uk/news/geotechnical/greater-consideration-of-liquefaction-risks-urged-by-christchurch-report/8640174.article>)



Construction workers freed from China tunnel collapse

Five construction workers have been rescued after being trapped in a collapsed railway tunnel in northwest China for two days.

They had been working in the tunnel in the city of Lanzhou when the collapse occurred at about 2.30pm local time on Wednesday.

That evening a 14cm wide hole was dug to deliver food and water, and later a camera and telephone line.

The men were eventually freed at 10pm on Friday night.

(BBC News, 15 December 2012, <http://www.bbc.co.uk/news/world-asia-china-20739028>)



US mudslide derails moving train

A mudslide in the US state of Washington has derailed a moving freight train. Amateur video shows the landslip hitting the train and knocking the trucks from the track.

(BBC News, 19 December 2012, <http://www.bbc.co.uk/news/world-us-canada-20778774>)

ΕΝΔΙΑΦΕΡΟΝΤΑ - ΛΟΙΠΑ

Πετώντας πάνω από την Ελλάδα

Μια μαγευτική περιήγηση -σε high definition- πετώντας πάνω από την Ελλάδα. Ξεκινώντας από την Αθήνα, θα μας ταξιδέψει σε μοναδικά μέρη εξερευνώντας διάσπαρτα Ελληνικά νησιά στο λαμπρό μπλε του Αιγαίου, αρχαία ερείπια, καταπράσινους λόφους, βραχώδεις ακτές και ιστορικούς τόπους γεμάτους παραδόσεις. Την δραματική άποψη ενισχύει η μουσική του Βαγγέλη Παπαθανασίου! Θα πετάξουμε από την Κέρκυρα στην Κρήτη, από τα Μετέωρα στην Μύκονο, στην Πελοπόννησο, στη Ρόδο, στη Σαντορίνη, στη Θεσσαλονίκη και σε πολλούς άλλους λαμπούς προορισμούς αυτού του υπέροχου τόπου!

<http://www.youtube.com/watch?v=RhVMd8iXHMo>



Στα χρόνια της Ανθρωπόκαινου Ο άνθρωπος έφερε τον πλανήτη «σε μια νέα γεωλογική εποχή»

Με τις ανθρώπινες δραστηριότητες να αλλάζουν δραστικά το πρόσωπο του πλανήτη, οι γεωλόγοι σκέφτονται να κηρύξουν την έναρξη μιας νέας γεωλογικής εποχής: της Ανθρωπόκαινου.

Στο ετήσιο συνέδριο της Αμερικανικής Εταιρείας Γεωφυσικής, οι ερευνητές συζήτησαν κυρίως τα κριτήρια με βάση τα οποία θα όριζαν την αρχή αυτής της επικυριαρχίας του ανθρώπου -παρά τις δραματικές αλλαγές που παρατηρούνται σε όλο τον κόσμο, ο ορισμός μιας νέας γεωλογικής εποχής είναι δύσκολη υπόθεση.



Η συσσώρευση πλαστικών στα ιζήματα θα μπορούσε να χρησιμοποιηθεί ως κριτήριο της νέας γεωλογικής εποχής

«Αν πρόκειται για νέα γεωλογική περίοδο, θα πρέπει να είναι εμφανής στο γεωλογικό αρχείο» επισήμανε στο LiveScience.com ο Άντονι Μπράουν του Πανεπιστημίου του Σαουθάμπτον στη Βρετανία.

Σύμφωνα με τον ίδιο, η έναρξη της Ανθρωπόκαινου θα μπορούσε να οριστεί με βάση τις αλλαγές που φέρνει στο σχηματισμό ιζημάτων η γεωργία. Για παράδειγμα, η αποψίλωση των δασών για τη δημιουργία καλλιεργητικών εκτάσεων αλ-

λάζει την απορροή του βρόχινου νερού σε ποτάμια και λίμνες, δημιουργώντας συχνά ένα παχύ ιζημα λάσπη.

Άλλοι ερευνητές θεωρούν προβληματική αυτή την πρόταση, επισημαίνοντας ότι η γεωργία δεν υιοθετήθηκε ταυτόχρονα σε όλο τον πλανήτη. Σε ορισμένες περιοχές της Αφρικής, για παράδειγμα, η εντατική γεωργία είναι πρόσφατη εξέλιξη.

Οι γεωλόγοι θα μπορούσαν να παρακάμψουν το πρόβλημα ορίζοντας την έναρξη της Ανθρωπόκαινου με βάση τις αποθέσεις χημικών ουσιών τον 20ό αιώνα, αφού η εκτεταμένη χρήση μολύβδου στη βενζίνη και στις μογιές έχει ήδη αφήσει ίχνη αυτού του μετάλλου στα εδάφη όλου του κόσμου. Ένα άλλο κριτήριο θα μπορούσε να είναι η παρουσία πολυκυκλικών αρωματικών υδρογονανθράκων, οι οποίοι παράγονται από τις πυρκαγιές και την καύση ορυκτών καυσίμων.

«Στα μέσα του 20ού αιώνα καταγράφεται μια απότομη αύξηση σε αυτά τα χημικά στο έδαφος» είπε ο Μάικλ Κρούγκερ του Πολιτειακού Πανεπιστημίου Μοντκλέρ στο Νιού Τζέρσι.

Μια τέταρτη ιδέα για τον ορισμό της έναρξης της Ανθρωπόκαινου εποχής αφορά τις πρωτοφανείς μετατοπίσεις εδαφών από την εξορυκτική δραστηριότητα, ή τη συσσώρευση ορυκτών από την καύση λιθάνθρακα, την παραγωγή τσιμέντου και τη χρήση λιπασμάτων.

Για άλλους γεωλόγους, το απλούστερο και ασφαλέστερο κριτήριο θα ήταν τα πλαστικά υλικά που θάβονται στα ιζήματα ή γεμίζουν τις χωματερές των πόλεων. Το κριτήριο δεν θα ίσχυε φυσικά μόνο για τις πυκνοκατοικημένες περιοχές, αφού τα πλαστικά σταδιακά διαλύονται σε κομματάκια που μπορούν να κάνουν το γύρο του κόσμου.

Πάντως, όποια άποψη κι αν επικρατήσει τελικά σχετικά με την Ανθρωπόκαινο εποχή, οι γεωλόγοι θα έπρεπε να λάβουν υπόψη και τους κλιματικούς και αστρονομικούς παράγοντες που συνήθως σηματοδοτούν τη μετάβαση σε μια νέα εποχή.

Όπως επισήμανε ο Δρ Μπράουν, «πρέπει να συνδυάσουμε την ανθρωπογενή ποικιλότητα και την φυσική ποικιλότητα στο κλιματικό σύστημα».

«Είναι ένα ερώτημα που οι γεωλόγοι δεν χρειάστηκε να αντιμετωπίσουν ποτέ στο παρελθόν».

(Newsroom ΔΟΛ, 10 Δεκεμβρίου 2012, <http://news.in.gr/science-technology/article/?aid=1231225971>)



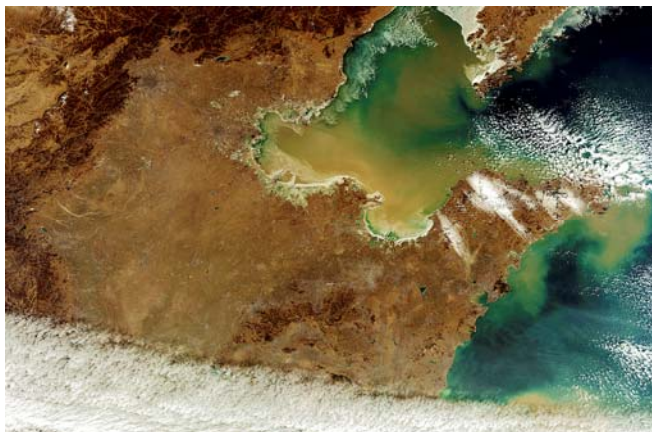
Μια εικόνα εξηγεί Πώς πήρε το όνομά της η Κίτρινη Θάλασσα στην Κίνα

Η νέα δορυφορική εικόνα που έστειλε στο in.gr η ευρωπαϊκή διαστημική υπηρεσία ESA γεμίζει από το χαρακτηριστικό χρώμα της Κίτρινης Θάλασσας, έξω από τη μεγάλη πεδιάδα της Βόρειας Κίνας.

Η λεπτή κίτρινη γραμμή που διακρίνεται κεντρικό τμήμα της εικόνας είναι ο Κίτρινος Ποταμός που ρέει προς τα βορειοανατολικά και εκβάλλει στην Κίτρινη Θάλασσα.

Αρκετά ακόμα ποτάμια εκβάλλουν στην ίδια περιοχή, μεταφέροντας την ιλύ και την άμμο που ευθύνονται για το χρώμα και το όνομα της Κίτρινης Θάλασσας.

Τα υλικά αυτά κάνουν εξαιρετικά εύφορη την περιοχή, στην οποία καλλιεργούνται κεχρί, καλαμπόκι, βαμβάκι, σάρι, σουσάμι και φυστίκια.



Η εύφορη κοιλάδα είναι επίσης από τις πλέον πυκνοκατοικημένες περιοχές του κόσμου.

Το χρώμα της Κίτρινης Θάλασσας επηρεάζεται πάντως και από τις μεγάλες συγκεντρώσεις φυτοπλαγκτού, το οποίο λιπαίνεται κι αυτό από τα θρεπτικά συστατικά που μεταφέρουν τα ποτάμια.

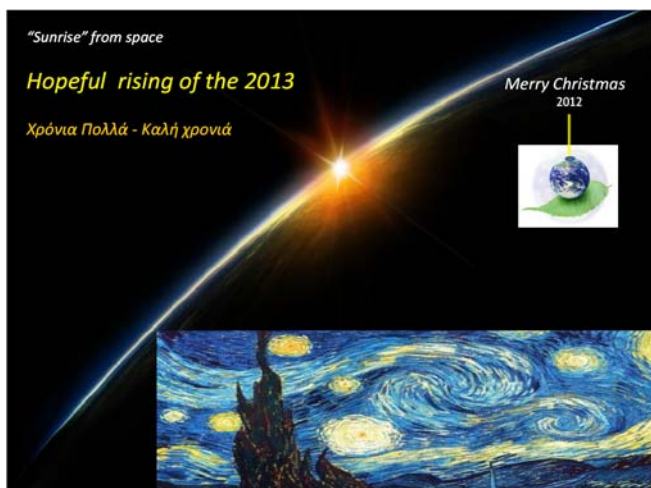
Στο πάνω αριστερά τμήμα της εικόνας, η πόλη του Πεκίνου διακρίνεται ως αμυδρή καφέ κηλίδα στους πρόποδες των γύρω βουνών.

Η εικόνα ελήφθη στις 8 Φεβρουαρίου από το όργανο MERIS (φασματόμετρο απεικόνισης μέσης ανάλυσης) του δορυφόρου γεωσκόπησης Envisat.

(Newsroom ΔΟΛ, 10 Δεκεμβρίου 2012, <http://news.in.gr/science-technology/article/?aid=1231225990>)



Μια ενδιαφέρουσα μαθηματική ερμηνεία των πινάκων του Van Gogh



Van Gogh-starry night

Στο έργο του αυτό ο Βαν Γκογκ έχει απεικονίσει χαοτικές δίνες (**chaotic vortices, the sense of turbulence**) που ακολουθούν την κλιμάκωση Κολμογκόροφ (**turbulent flow as predicted by the statistical theory of A.N. Kolmogorov**), όπως προκύπτει από μαθηματική ανάλυση της εικόνας. Ο Βαν Γκογκ αναπαράγει σε πίνακές του, επακριβώς, νόμους της φύσης (Wikipedia).



Στη Φύση οι νομοί αυτοί συνεχίζουν να ρυθμίζουν την εξέλιξη της ανεξάρτητα από μας, ενώ σε κοινωνικό επίπεδο, στο βάθος του λεπτότατου ατμοσφαιρικού ωκεανού, στην επιφάνεια ενός μικρού αλλά δυναμικού πλανήτη, νομίζω ότι απεικονίζουν και τις σημερινές κοινωνικές δίνες της χώρας μας και του παγκοσμιοποιημένου κοινωνικού-οικονομικού περιβάλλοντος (**turbulent in societies, like today's economic -and not only- crisis**). Οι ευχές μας, ως επιθυμίες μας, είναι να αποδεσμευτούμε γρήγορα από τις δίνες που μας περιδινίζουν (**vortices**). Να ξεπεραστούν τα μεγάλα προβλήματα κοινωνικά και προσωπικά. (The wishes, as our desires, is to disengage quickly from our **turbulent flow**. To overcome the major social and our personal problems). Είθε.

Best Wishes

Σπύρος - Spyros (Παυλίδης)

Ref. J Math Imaging Vis (2008) 30: 275–283
DOI 10.1007/s10851-007-0055-0 "**Turbulent Luminance in Impassioned van Gogh Paintings**"
J.L. Aragón · Gerardo G. Naumis · M. Bai · M. Torres · P.K. Maini



Changing the History: Building a 30-Story Hotel in 15 days

What can you accomplish in 360 hours?

The Chinese Sustainable building company, Broad Group, has yet attempted another impossible feat, building a 30-story tall hotel prototype in 360 hours, after building a 15-story building in a week earlier in 2011.

改造历史，15天内建成30层酒店。远大集团。

https://www.youtube.com/watch?feature=player_embedded&v=GVUsIlwWWM8





Volkswagen's The People's Car Project: Hover Car

Volkswagen gathers ideas from the people of China to help innovate future cars. We took one girl's idea for a hover car and made it into reality.

[http://www.youtube.com/watch?feature=player_embedded
&v=Ew4Y5HlyT6c](http://www.youtube.com/watch?feature=player_embedded&v=Ew4Y5HlyT6c)

<http://www.youtube.com/watch?v=ubpObNY0NTI>

ΗΛΕΚΤΡΟΝΙΚΑ ΠΕΡΙΟΔΙΚΑ



International Society for Rock Mechanics



newsletter

No. 20 - December 2012

http://www.isrm.net/adm/newsletter/ver_html.php?id_newsletter=78&ver=1

Κυκλοφόρησε το Τεύχος 20 / Δεκέμβριος 2012 του Newsletter της International Society for Rock Mechanics. Περιεχόμενα:

- President's 2013 New Year Address
- ISRM 50-years anniversary celebrations closed in Salzburg at the Geomechanics Colloquy
- ISRM Franklin Lecture instituted to honour the memory of late Past President Professor John Franklin
- ISRM Online Lectures Series: a new initiative to start in February 2013
- Former ISRM Vice President Dr. François Huez passed away
- ARMS7 was held in Seoul with great success
- ISRM International Symposium EUROCK 2013 - full papers to be submitted by 15 March
- An update on the International Conference for Effective and Sustainable Hydraulic Fracturing - HF2013
- An update on the third ISRM SINOROCK Symposium
- An update on the 6th Rock Stress Symposium - RS2013
- First bulletin of the ISRM 2014 International Symposium - ARMS8, in Japan
- ISRM sponsored meetings
- A massive Global Energy Assessment study involved experts from around the world
- Journal of the ISRM National Group of India



INTERNATIONAL TUNNELLING AND
UNDERGROUND SPACE ASSOCIATION
ita@news n°47

www.ita-aites.org/index.php?id=919&no_cache=1

Κυκλοφόρησε το Τεύχος No. 47 - Δεκέμβριος 2012 των ita@news της International Tunnelling Association με τα παρακάτω περιεχόμενα:

- Message from In Mo LEE, ITA President
- International Tunnelling Awards
- News from ITACOSUF

- DemInar on Sprayed waterproofing membrane
- News from ITAtech
- WTC 2013
- WTC 2014
- New Supporters
- News from PIARC
- News from Turkey
- Montreal and Toronto Conferences
- News from Colombia
- Tunnelling Asia 2013
- Underground Construction - Prague 2013
- TU-SEOUL 2013



<http://www.icold-ciqb.org/GB/News/newsletter.asp?IDA=263>

Κυκλοφόρησε το Τεύχος 12 (Ιούλιος 2012) του **The Dams Newsletter** της **International Commission on Large Dams** με τα παρακάτω περιεχόμενα:

- Successful Congress in Kyoto
- 6th WWF stresses Water Food Energy
- The WCD question in Marseille
- WD water storage for sustainable development
- Central Europe goes for PSP
- ICOLD regional Clubs



www.geoengineer.org

Κυκλοφόρησε το Τεύχος #95 του **Newsletter του Geoengineer.org** (Δεκέμβριος 2012) 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).





http://www.itacet.org/Newsletter/14_2012/ITACET_NL_14_2012.php

Κυκλοφόρησε το Τεύχος Νο. 14 (Νοέμβριος 2012) του ITACET Foundation με τα παρακάτω περιεχόμενα:

- Editorial. Felix Amberg
- Interview: Martin Herrebknecht
- New Donor
- News from Torino
- Training Session in Singapore
- Training Session in Shanghai
- Scholarship
- Next Events
- Season's Greetings



<http://library.constantcontact.com/download/get/file/1111082143825-34/2012-11-igs-news-a7.pdf>

Κυκλοφόρησε το Τεύχος 3, Volume 28 των **IGS News**. Μεταξύ των θεμάτων περιλαμβάνονται:

- President's Corner
- Members-Only Proceedings
- Library
- IGS Council Elections Results
- Valencia - EuroGeo5
- News from the Technical Committees
- Conference Reports
- Conference Announcements
- News from IGS Chapters and Membership



Geotextiles & Geomembranes

www.geosyntheticssociety.org/journals.htm

Κυκλοφόρησε ο τόμος 35 (Δεκεμβρίου 2012) με τα παρακάτω περιεχόμενα:

- Monitoring of a landfill side slope lining system: Instrument selection, installation and performance, Pages 1-13, Katarzyna A. Zamara, Neil Dixon, D. Russell V. Jones, Gary Fowmes
- Performance of geocell-reinforced recycled asphalt pavement (RAP) bases over weak subgrade under cyclic plate loading, Pages 14-24, Jitendra K. Thakur, Jie Han, Sanat K. Pokharel, Robert L. Parsons
- Predictive modeling on seismic performances of geosynthetic-reinforced soil walls, Pages 25-40, K.Z.Z. Lee, N.Y. Chang
- Laboratory investigation on the effect of transverse member on pull out capacity of metal strip reinforcement in sand, Pages 41-49, J. Esfandiari, M.R. Selamat
- A new theoretical method to evaluate the upper limit of the retention ratio for the design of geotextile filters in contact with broadly granular soils, Pages 50-60, Nicola Moraci, Domenico Ielo, Maria Clorinda Mandaglio
- 3D numerical analyses of geosynthetic encased stone columns, Pages 61-68, L. Keykhosropur, A. Soroush, R. Imam
- Durability of transesterified jute geotextiles, Pages 69-75, Prosenjit Saha, Debasis Roy, Suvendu Manna, Basudam Adhikari, Ramkrishna Sen, Sukumar Roy
- Discrete element modelling of cyclic loads of geogrid-reinforced ballast under confined and unconfined conditions, Pages 76-86, Cheng Chen, G.R. McDowell, N.H. Thom
- Development of a methodology for the evaluation of geomembrane strain and relative performance of cushion geotextiles, Pages 87-99, W.P. Hornsey, D.M. Wishaw
- Evaluation of a final cover slide at a landfill with recirculating leachate, Pages 100-106, Craig H. Benson, Tuncer B. Edil, Xiaodong Wang
- Geogrid-reinforced lime-treated cohesive soil retaining wall: Case study and implications, Pages 112-118, Guangqing Yang, Huabei Liu, Peng Lv, Baojian Zhang
- Geotextile sand filled containers as coastal defence: South African experience, Pages 120-130, Stefano Corbella, Derek D. Stretch
- Uplift behavior of plates embedded in fiber-reinforced cement stabilized backfill, Pages 107-111, Nilo Cesar Consoli, Antônio Thomé, Vinicius Girardello, Cesar Alberto Ruver
- Corrigendum to 'Model experiments on piled embankments. Part II' [Geotextiles and Geomembranes volume 32 (2012) pp. 82-94], Page 119, S.J.M. van Eekelen, A. Bezuijen, H.J. Lodder, A.F. van Tol

Πρόσβαση μέσω της ιστοσελίδας

<http://www.sciencedirect.com/science/journal/02661144>



Journal of the ISRM National Group of India

http://www.isrm.net/fotos/editor2/NI20/india_isrm_journal_july_2012.pdf

ΕΚΤΕΛΕΣΤΙΚΗ ΕΠΙΤΡΟΠΗ ΕΕΕΕΓΜ (2012 – 2015)

Πρόεδρος :	Χρήστος ΤΣΑΤΣΑΝΙΦΟΣ, Δρ. Πολιτικός Μηχανικός, ΠΑΝΓΑΙΑ ΣΥΜΒΟΥΛΟΙ ΜΗΧΑΝΙΚΟΙ Ε.Π.Ε. president@hssmge.gr , editor@hssmge.gr , ctsatsanifos@pangaea.gr
Α' Αντιπρόεδρος :	Παναγιώτης ΒΕΤΤΑΣ, Πολιτικός Μηχανικός, ΟΜΙΛΟΣ ΤΕΧΝΙΚΩΝ ΜΕΛΕΤΩΝ Α.Ε. otmate@otenet.gr
Β' Αντιπρόεδρος :	Μιχάλης ΠΑΧΑΚΗΣ, Πολιτικός Μηχανικός mpax46@otenet.gr
Γενικός Γραμματέας :	Μαρίνα ΠΑΝΤΑΖΙΔΟΥ, Δρ. Πολιτικός Μηχανικός, Αναπληρώτρια Καθηγήτρια Ε.Μ.Π. secretary@hssmge.gr , mpanta@central.ntua.gr
Ταμίας :	Μανώλης ΒΟΥΖΑΡΑΣ, Πολιτικός Μηχανικός e.vouzaras@gmail.com
Αναπληρωτής Ταμία :	Γιώργος ΝΤΟΥΛΗΣ, Πολιτικός Μηχανικός, ΕΔΑΦΟΜΗΧΑΝΙΚΗ Α.Ε. ΓΕΩΤΕΧΝΙΚΕΣ ΜΕΛΕΤΕΣ Α.Ε. gdoulis@edafomichaniki.gr
Έφορος :	Γιώργος ΜΠΕΛΟΚΑΣ, Δρ. Πολιτικός Μηχανικός, Κέντρο Δομικών Ερευνών και Προτύπων ΔΕΗ gbelokas@gmail.com , gbelokas@central.ntua.gr
Μέλη :	Ανδρέας ΑΝΑΓΝΩΣΤΟΠΟΥΛΟΣ, Δρ. Πολιτικός Μηχανικός, Ομότιμος Καθηγητής ΕΜΠ aanagn@central.ntua.gr Μιχάλης ΚΑΒΒΑΔΑΣ, Δρ. Πολιτικός Μηχανικός, Αναπληρωτής Καθηγητής ΕΜΠ kavvadas@central.ntua.gr
Αναπληρωματικά Μέλη :	Χρήστος ΑΝΑΓΝΩΣΤΟΠΟΥΛΟΣ, Δρ. Πολιτικός Μηχανικός, Καθηγητής Πολυτεχνικής Σχολής ΑΠΘ anag@civil.auth.gr , canagnostopoulos778@gmail.com Σπύρος ΚΑΒΟΥΝΙΔΗΣ, Δρ. Πολιτικός Μηχανικός, ΕΔΑΦΟΣ ΣΥΜΒΟΥΛΟΙ ΜΗΧΑΝΙΚΟΙ Α.Ε. scavounidis@edafos.gr Δημήτρης ΚΟΥΜΟΥΛΟΣ, Δρ. Πολιτικός Μηχανικός, ΚΑΣΤΩΡ Ε.Π.Ε. coumoulos@castorltd.gr Μιχάλης ΜΠΑΡΔΑΝΗΣ, Πολιτικός Μηχανικός, ΕΔΑΦΟΣ ΣΥΜΒΟΥΛΟΙ ΜΗΧΑΝΙΚΟΙ Α.Ε. mbardanis@edafos.gr , lab@edafos.gr

ΕΕΕΕΕΓΜ

Τομέας Γεωτεχνικής
ΣΧΟΛΗ ΠΟΛΙΤΙΚΩΝ ΜΗΧΑΝΙΚΩΝ
ΕΘΝΙΚΟΥ ΜΕΤΣΟΒΙΟΥ ΠΟΛΥΤΕΧΝΕΙΟΥ
Πολυτεχνειούπολη Ζωγράφου
15780 ΖΩΓΡΑΦΟΥ

Τηλ. 210.7723434
Τοτ. 210.7723428
Ηλ-Δι. secretariat@hssmge.gr ,
geotech@central.ntua.gr
Ιστοσελίδα www.hssmge.org (υπό κατασκευή)

«ΤΑ ΝΕΑ ΤΗΣ ΕΕΕΕΕΓΜ» Εκδότης: Χρήστος Τσατσάνιφος, τηλ. 210.6929484, τοτ. 210.6928137, ηλ-δι. pangaea@otenet.gr,
ctsatsanifos@pangaea.gr, editor@hssmge.gr

«ΤΑ ΝΕΑ ΤΗΣ ΕΕΕΕΕΓΜ» «αναρτώνται» και στην ιστοσελίδα www.hssmge.gr