Mount Fuji From Above, Japan

ΕΛΛΗΝΙΚΗ ΕΠΙΣΤΗΜΟΝΙΚΗ ΕΤΑΙΡΕΙΑ ΕΔΑΦΟΜΗΧΑΝΙΚΗΣ & ΓΕΩΤΕΧΝΙΚΗΣ ΜΗΧΑΝΙΚΗΣ

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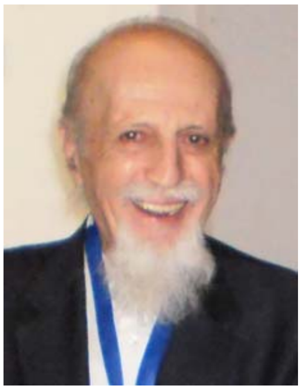
Βράβευση Καθηγητού Θεοδόση Τάσιου



Με απόφαση της Εκτελεστικής Επιτροπής της IABSE (International Association for Bridge and Structural Engineering) απενεμήθη το **2013 International Award of Merit in Structural Engineering** στον ομότιμο καθηγητή της Σχολής Πολιτικών Μηχανικών του Εθνικού Μετσοβίου Πολυτεχνείου και ιδρυτικό μέλος της ΕΕΕΕΓΜ Θεοδόση Τάσιο.

Σύμφωνα με τα αναφερόμενα στον ιστοχώρο της IABSE (www.iabse.org/awards) "The International Award of Merit in Structural Engineering is presented to people for outstanding contributions in the field of structural engineering, with special reference to usefulness for society. Fields of endeavour may include: planning, design, construction, materials, equipment, education, research, government, management. The first Award was presented in 1976."

Η απονομή του βραβείου θα γίνη από τον Πρόεδρο της IABSE Predrag L. Popovic κατά την Εναρκτήρια Συνεδρίαση του 36^{th} IABSE Symposium στην Kolkata, Ινδία, 24 – 27 Σεπτεμβρίου 2013.

Δέκα Τάσιους να είχαμε, θα ήταν διαφορετικά τα πράγματα!

SIMSG ISSMGE

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Π Ε Ρ Ι Ε Χ Ο Μ Ε Ν Α

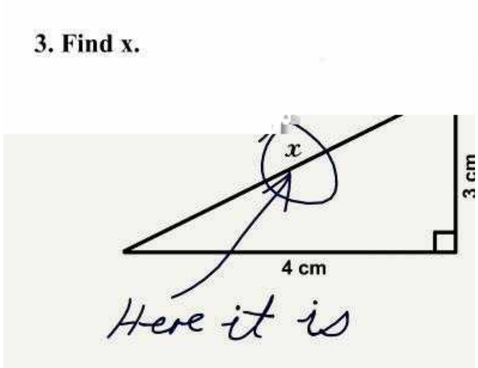
Μαθηματικές ιδιοφυίες

Solving equation by one Blondie:

$$\frac{1}{n}\sin x = ?$$

$$\frac{1}{\cancel{n}}\mathrm{si}\cancel{n}\,x =$$

$$six = 6$$

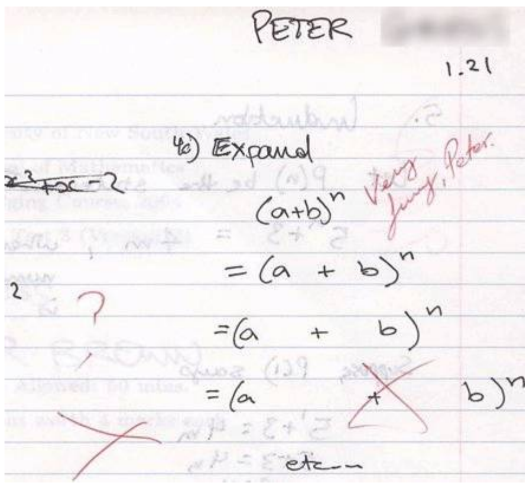


After explaining to a student through various lessons and examples that:

$$\lim_{x \to 8} \frac{1}{x-8} = \infty$$

I tried to check if she really understood that, so I gave her a different example. This was the result:

$$\lim_{x \to 5} \frac{1}{x-5} = \text{ഗ}$$



ΑΡΘΡΑ

Design approaches of Eurocode 7 for the verification of ultimate limit states in geotechnical design in France and Germany

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ABSTRACT. This paper describes the three design approaches (DA 1, DA 2 and DA 3) offered by Eurocode 7 on 'Geotechnical design' for verifying ultimate limit states in persistent or transient design situations (i.e. under fundamental combinations). They are applied and compared in the case of a strip footing under eccentric and inclined loading. Both in France and in Germany, DA 2 has been selected for most geotechnical structures, though with some differences between the two countries for a limited number of cases. The principles and the choices made for the selection of the design approach, as well as of the values for the partial factors of safety, are explained for the two countries.

RÉSUMÉ. Cet article décrit les trois approches de calcul (AC 1, AC 2 et AC 3) proposées par l'Eurocode 7 sur le ''Calcul géotechnique'' pour vérifier les états limites ultimes sous combinaisons fondamentales. Elles sont appliquées et comparées dans le cas d'une fondation filante soumise à une charge excentrée et inclinée. Tant en France qu'en Allemagne, l'approche AC 2 a été retenue pour la majorité des ouvrages géotechniques, avec cependant quelques différences entre les deux pays pour un nombre limité de cas. Les principes et les choix opérés pour la sélection de l'approche de calcul, ainsi que des valeurs des coefficients de sécurité partiels sont expliqués pour les deux pays.

KEYWORDS: Eurocode 7, geotechnical design, ultimate limit states, design approach, shallow foundation, load eccentricity, load inclination, partial factors of safety.

MOTS-CLÉS Eurocode 7, calcul géotechnique, états limites ultimes, approche de calcul, fondation superficielle, charge excentrée, charge inclinée, facteurs de sécurité partiels.

1. Introduction

When implementing *Eurocode 7: Geotechnical Design, Part 1: General Rules* (EC 7-1; EN 1997-1, 2005), each European country needs to make two important decisions concerning the design of geotechnical structures. EC7-1 is a Limit State Design (LSD) method used in conjunction with a partial factor method. For Ultimate Limit States (ULS) in persistent and transient situations (fundamental combinations), three design approaches are described in the code (DA 1, DA 2 and DA 3) and each country can select the one that best suits its national design traditions and stipulate its use in geotechnical design. Furthermore, the countries must establish the values of the partial factors in accordance with national safety requirements. Both the choice of design approach and the selection of the partial factors must be seen as a single unit as they are interdependent.

In Germany, as explained in section 3.1, the selection of the design approach and the numerical values of the partial factors was based on the principle that the safety level of the global safety concept that has been used successfully for decades should be maintained as far as possible, i.e. a geotechnical design in accordance with EC 7-1 should result in more or less the same dimensions as the former global safety concept. In France, the aim was also to maintain more or less the same dimensions as in present practice, as it was also felt that the introduction of Eurocode 7 should neither result in more expensive structures nor should the level of safety be decreased. Nevertheless, as there was already an experience in using limit state design and partial factors of safety for designing shallow and deep foundations (see Section 3.2), the final choice was slightly different from the German one.

Indeed, in both France and Germany, Design Approach 2 has been selected for the verification of ULS of foundations and retaining structures in persistent and transient situations. This is because in this Approach, only one combination of actions (loads) is basically required and the resistance factor for the ground is applied, at the end, to its total calculated resistance. The difference between the two countries lies in the application of the load factors. These are applied at the source in France (DA 2 in the "original" sense), but are rather applied at the end of the calculation in Germany (this design is called DA 2*, see Frank *et al.*, 2004). Both design approaches DA 2 and DA 2* give the same results except for the bearing capacity of shallow footings with eccentric and inclined loads.

The comparative design, in which all Design Approaches in EC 7-1 (DA 1, DA 2, DA 2* and DA 3) are applied, is precisely a strip footing with eccentric and inclined loads. It has been chosen because it shows the difference between the options that have been selected for Germany and France.

The implementation of EC 7-1 is currently being discussed in each European country. The authors are of the opinion that this matter should not only be discussed inside the countries, but must also be debated throughout Europe. That is why this paper is being prepared in order to compare the situation in other European countries to the French and German situations.

2. Verification of the ultimate limit states in geotechnical engineering

2.1 General

Thanks to the Eurocodes, a single format will be used for the mathematical analysis of the ultimate limit states throughout the construction sector in Europe in the future. Accordingly, for any section in a structure, structure-soil interface or the soil, it will have to be verified that the design value of the effects of actions, Ed, never exceeds the design bearing capacity or the design resistances, Rd, i.e.:

$$E_d \leq R_d \quad [1]$$

There has to be a clear-cut distinction between the effects of actions and resistances in order for the general limit state equation (1) to be applied. Such a distinction can be made without much difficulty in other fields of structural engineering. However, in geotechnical engineering, there are many cases in which it is not possible to make a clear-cut distinction between the effects of actions and the resistances. For instance, the action of the active earth pressure also depends on the shearing resistance or the shear strength in the failure surface of the active sliding wedge. In other cases, the resistance of the soil depends on the magnitude of the action. For instance, the sliding resistance is governed by the magnitude of the effect of the action due to the vertical component of the bearing pressure resultant.

Additional problems concerning the application of equation (1) are caused by the fact that there are two entirely different ways of introducing the partial safety factors in geotechnical engineering, as described below:

– on the one hand, the design values, E_d and R_d, of the effects of geotechnical actions and resistances can be determined by what is known as the *method of factored shear parameters* (MFA: 'material factor approach'). In this method, the partial factors are applied, at the source, to the characteristic shear parameters, φ'_k and c'_k of the ground. Thus the design value of the effective coefficient of friction, tan φ'_d, is determined by dividing the characteristic coefficient of friction, tan φ'_k, by the partial factor for friction, γ_j'. Similarly, the design cohesion, c'_d, is obtained by dividing the characteristic cohesion, c'_k, by the partial factor for cohesion, γ_c', i.e.:

$$\tan \varphi'_d = \tan \varphi'_k / \gamma_j' \quad [2]$$

$$c'_d = c'_k / \gamma_c' \quad [3]$$

The design values of the geotechnical actions and resistances, E_d and R_d, to be used in the limit state equation (1) are then determined with the design values of the shear parameters, φ'_d and c'_d;

– on the other hand, there is the *method of factored effects of actions and resistances*. In this method, the characteristic values of the actions, effects of actions and resistances of the soil, F_k, E_k and R_k respectively, are first determined using the characteristic values of the shear parameters, φ'_k and c'_k. The design values of the effects of actions, E_d, (stresses, internal forces and moments) and the resistances are then obtained by applying the partial factors for the effects of actions and resistances, γ_E and γ_R, to the characteristic values, i.e.:

$$E_d = E_k \times \gamma_E \quad [4]$$

$$R_d = R_k / \gamma_R \quad [5]$$

Equation [5] illustrates what is often referred to as the RFA: 'resistance factor approach'.

These different ways are the principle reason why EC 7-1 offers three different approaches (DA 1, DA 2 and DA 3) for verifying geotechnical ultimate limit states in persistent and transient situations. DA 1 uses the MFA, except for piles and anchorages for which it uses the RFA. DA 2 and DA 2* use the RFA, and DA 3 uses the MFA (see below).

The choice of the design approach can be determined nationally by each Standards Body (e.g., AFNOR, DIN, etc.). Yet different design approaches can be used to verify different limit states. The numerical values of the partial factors to be applied in a given design procedure can also be determined nationally and be specified in the National Annex to EC 7-1.

The three design approaches of EC 7-1 differ in the way in which they introduce the partial factors on the actions and resistances (see Table 1 for the case of shallow foundations). As regards the actions and effects of actions, a distinction is made between actions coming from the structure and actions coming from the ground (geotechnical actions).

DA 1 is the original approach offered in the ENV (CEN 1994). It uses two different combinations of actions (former cases B and C of the ENV, see section 2.2). DA 2 and DA 3 were introduced later (when drafting the final EN 1997-1), because many countries did not wish to have to have two verifications, as they found it easier to convert their national practice into one single combination where the partial factors would be distributed both on the actions (or effects of the actions) and on the resistances (see sections 2.3 and 2.4). The difference between the two lies in the format for the resistances. DA 2 uses the RFA and DA 3 uses the MFA.

Table 1. *Recommended values of partial factors ULS for persistent and transient situations for the design of shallow foundations (EN 1997-1, Annex A)*

Design Approach		Actions or effects of actions: Of the structure	Actions or effects of actions: of the ground	Resistance of the ground
DA 1	Comb 1	$\gamma_G = 1.35$; $\gamma_{G,inf} = 1.00$; $\gamma_Q = 1.50$		$\gamma_R = \gamma_{\varphi'} = \gamma_{c'} = \gamma_{cu} = 1.00$
	Comb 2	$\gamma_G = 1.00$; $\gamma_Q = 1.30$	$\gamma_Q = 1.30$; $\gamma_{\varphi'} = \gamma_{c'} = 1.25$; $\gamma_{cu} = 1.40$ $\gamma_R = 1.00$	
DA 2, DA 2*		$\gamma_G = 1.35$; $\gamma_{G,inf} = 1.00$; $\gamma_Q = 1.50$		$\gamma_{R,e} = \gamma_{R,v} = 1.40$ $\gamma_{R,h} = 1.10$ $\gamma_{\varphi'} = \gamma_{c'} = \gamma_{cu} = 1.00$
DA 3		$\gamma_G = 1.35$; $\gamma_{G,inf} = 1.00$ $\gamma_Q = 1.50$	$\gamma_Q = 1.30$; $\gamma_{\varphi'} = \gamma_{c'} = 1.25$; $\gamma_{cu} = 1.40$ $\gamma_R = 1.00$	

γ_G: partial factor for unfavourable permanent actions,
$\gamma_{G,inf}$: partial factor for favourable permanent actions
γ_Q: partial factor for unfavourable variable actions. Note that favourable variable actions are not taken into account, i.e. $\gamma = 0$
$\gamma_{R,e}$: partial factor for passive earth pressure on the side of the shallow foundation
$\gamma_{R,v}$: partial factor for ground bearing resistance
$\gamma_{R,h}$: partial factor for resistance to sliding

With regard to the design in accidental situations, Eurocode 7 – Part 1 states that (clause 2.4.7.1 in EN 1997-1): *'(3) All values of partial factors for actions or the effects of actions in accidental situations should normally be taken equal to 1,0. All values of partial factors for resistances should then be selected according to the particular circumstances of the accidental situation. NOTE: The values of the partial factors may be set by the National annex.'*

2.2. *Design Approach DA 1*

In Design Approach DA 1, two combinations of partial factors have to be investigated. Combination 1 was referred to as "case B" in the prestandard to EC 7-1 (CEN, 1994). It aims to provide safe design against unfavourable deviations of the actions from their characteristic values. Thus, in Combination 1, partial factors greater than 1.0 are applied to the permanent and variable actions from the structure and the ground. The recommended factors, applied at the source, are: $\gamma_G = 1.35$ for unfavourable permanent actions, $\gamma_{G;\ inf} = 1.00$ for favourable permanent actions and $\gamma_Q = 1.50$ for variable actions.

The factors are the same as those used in other fields of structural engineering and they are consistent with those specified in *Eurocode: Basis of structural design* (EN 1990, 2002). By contrast, the calculations for the ground resistance are performed with characteristic values, i.e. the partial factors $\gamma_{\varphi'}$, $\gamma_{c'}$ and γ_{cu}, which are all set at 1.00, are applied to the shear parameters; the partial factor for the ground resistance, γ_R, is also 1.00, or near 1.00.

Combination 2 of Design Approach DA 1 was referred to as "case C" in the prestandard to EC 7-1. It aims to provide safe design against unfavourable deviations of the ground strength properties from their characteristic values and against uncertainties in the calculation model. Thus, the partial factors γ_{φ}', γ_c' and γ_{cu} with numerical values of 1.25 or 1.40 are applied, at the source, to the characteristic values of the ground strength parameters (MFA approach). It is assumed that the permanent actions from the structure correspond to their expected values ($\gamma_G = 1.0$) and that the variable actions deviate only moderately from their characteristic values ($\gamma_Q = 1.30$). The partial factors are applied to the representative values of the actions and to the characteristic values of the ground strength parameters at the beginning of the calculation. Thus the entire calculation is performed with the design values of the actions and the design shear strength. Note that for the design of axially loaded piles and anchors, the resistance factor approach (RFA) is to be used for Combination 2, instead of MFA (used in former "case C").

Of the 2 combinations, the one resulting in the larger dimensions of the foundation will be relevant for designs according to Design Approach DA 1.

2.3. *Design Approaches DA 2 and DA 2**

In Design Approach DA 2, only one verification is ever required unless different combinations of partial factors for favourable and unfavourable actions need to be dealt with separately in special cases. In DA 2, the partial factors applied to the geotechnical actions and effects of actions are the same as those applied to the actions on or from the structure, i.e.: γ_G = 1.35, $\gamma_{G:inf}$ = 1.00 and γ_Q = 1.50 (see EN 1990, 2002). The partial factors recommended for the ground resistances (RFA approach) are larger than 1.00 (see Table 1 for shallow foundations).

As mentioned earlier, there are two ways of performing verifications according to Design Approach DA 2. In the design approach referred to as "DA 2" by Frank *et al.* (2004), the partial factors are applied to the characteristic actions right at the start of the calculation and the entire calculation is subsequently performed with design values (see left part of Figure 1). By contrast, in the design approach referred to as "DA 2*" by Frank *et al.* (2004), the entire calculation is performed with characteristic values and the partial factors are not introduced until the end when the ultimate limit state condition is checked (see right part of Figure 1). As characteristic internal forces and moments are obtained in the calculation, the results can generally also be used as a basis for the verification of serviceability.

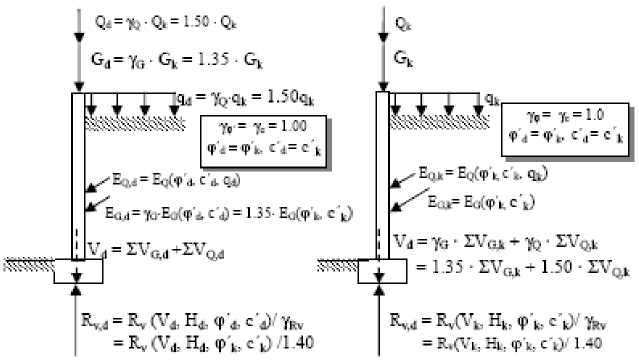

Figure 1. *Introduction of partial factors (recommended values) in the verification of ground bearing capacity using Design Approach 2: left: factoring actions at the source, Design Approach DA 2: right: factoring effects of actions, Design Approach DA 2*. For simplicity, only vertical equilibrium is considered and only unfavourable actions are shown*

2.4. Design Approach DA 3

Similarly, only one verification is required for Design Approach DA 3. The partial factors applied to the actions on the structure or coming from the structure are the same as those used in Design Approach DA 2 (see EN 1990, 2002). However, for the actions and resistances of the ground, the partial factors are not applied to the actions and resistances but are applied, at the source, to the ground strength parameters, φ΄, c΄ or cu instead (MFA approach). The recommended values for $\gamma_{\varphi'}$, $\gamma_{c'}$ and γ_{cu} are 1.25 and 1.40. The partial factors are applied to the representative values of the actions and to the characteristic values of the ground strength parameters at the beginning of the calculation. Thus, in Design Approach DA 3, the entire calculation is performed with design values of the actions and the design shear strength.

3. Principles for the selection of the design approach and the partial factors

3.1. *German situation*

Germany has a tradition of standards for geotechnical engineering that dates back more than 70 years. The first edition of DIN 1054, entitled *Guidelines for the permissible loads on ground in building construction*, was published in 1934. Since then, geotechnical standards have been optimised and improved continuously. The safety level of the former global safety concept proved successful and the specified safety factors made safe and economic geotechnical designs possible. The Advisory Board of the Standards Committee for Building and Civil Engineering of the German Standards Institute, DIN, therefore decided in 1998 that any increases in cost as a result of new standards had to be justified. As the existing standards were well tried and tested, it was decided that the safety level of the former global safety concept should be maintained when the geotechnical standards were adapted to accommodate the partial safety factor concept of the Eurocodes. This meant that the design approaches and the partial factors had to be selected in such a way that a foundation designed according to EC 7-1 would have roughly the same dimensions as a design in accordance with the previous standards. Thus the intention was to maintain the safety level of the former global safety concept when the Eurocodes were implemented. This was a prerequisite as serious problems regarding the acceptability of the Eurocodes would otherwise have arisen. For example, a structure undergoing modification might need strengthening or even underpinning according to the new safety concept, although this would not have been necessary under the previous one.

Maintaining the safety level of the former global safety concept was not only held as a basic principle to ensure the acceptability of the Eurocodes to German civil engineers but it was also a necessary assumption for the determination of the partial factors for geotechnical actions and resistances. In order to maintain the safety level of the former global safety concept in Design Approach DA 2 and DA2*, the equation:

$$\gamma_R \times \gamma_{G/Q} \approx \eta_{global} \quad [6]$$

must be fulfilled, where γ_R is the partial factor for the resistance of the ground, $\gamma_{G/Q}$ is the mean partial factor for the effects of permanent and variable actions and η_{global} is the global safety factor used hitherto. In Germany, it was decided to use the same partial factors for the permanent and variable effects of actions in geotechnical engineering as in other fields of structural engineering (γ_G = 1.35, γ_Q = 1.50). The numerical values of the partial factors have been specified by structural engineers and it is certainly debatable whether they provide a realistic description of the uncertainties in geotechnical engineering. Yet the standards committee for geotechnical engineering considered it more important for common partial factors to be used in all fields of civil engineering in future than for specific partial factors to be laid down for geotechnical design, especially as selecting the values would also have given rise to endless discussions. As the permanent actions are generally greater than the variable actions in geotechnical engineering, a weighted mean value, $\gamma_{G/Q}$, of 1.40 was used to calculate the partial factor for the ground resistance, γ_R, for the various verifications. After transposing equation (6), the following partial factor, γ_R, for the resistance is obtained:

$$\gamma_R \approx \eta_{global} / \gamma_{G/Q} \quad [7]$$

Thus, the following partial factor for the ground bearing resistance is obtained with a global safety factor, η_{global}, of 2.00, which is used in Germany for the verification of the ground bearing capacity : $\gamma_{R,v}$ ≈ 2.00/1.40 ≈ 1.40. The partial factors for the ground resistance in each limit state were determined in this way.

3.2. *French situation*

Since 1971, when the "*Directives Communes relatives au calcul des constructions*" were issued, the different documents available in France for the design of foundations and retaining structures have continuously evolved in order to accommodate the new limit state design (LSD) approach advocated by the structural engineers. Such documents are, for instance :

- FOND 72, published by the Ministry of Equipment (LCPC-SETRA) in 1972 and 1974, for the design of shallow and deep foundations;

- the D.T.U 13.2 (Technical Unified Document) for deep foundations of buildings, first published by CSTB in 1978 and then, as standard P 11-212, by AFNOR in 1992;

- the "Recommandations Terre Armée" (Reinforced Earth) first published by the Ministry of Equipment (LCPC-SETRA) in 1979 and then, as standard NF P 94-220, by AFNOR in 1998;

- the D.T.U 13.12 (Technical Unified Document) for shallow foundations of buildings, published as standard P 11-711 by AFNOR in 1988;

- the "Recommandations CLOUTERRE" for Soil nailing, published by the French national project CLOUTERRE, in 1990 and then, as standard XP P 94-240, by AFNOR in 1998;

- the Fascicule 62-Titre V, replacing FOND 72, published by the Ministry of Equipment in 1993, for shallow and deep foundations of civil engineering structures.

As soon as 1994, a group of experts (GEEC7) worked on the further adaptation of all these rules to the new LSD approach brought by the Eurocodes and, since 1998, an official AFNOR Committee (CNJOG) is in charge of the implementation of Eurocode 7 in France. Most geotechnical engineers, more or less already familiar with the concepts of limit states and partial factors, are now fully ready to accept all the changes which will arise by the full adoption of Eurocode 7 in the country.

In France, DA 2 has been selected for most of the cases of design of shallow and deep foundations and retaining structures, because it already corresponded to the design advocated by FOND 72 and the DTUs for foundations, as well as to the common practice of geotechnical designers for embedded walls. In some cases (for overall stability analyses, for the global stability analysis of embedded walls, for reinforced embankments or nailed earth structures and for numerical analyses of soil-structure interaction) DA 3 may also be used (see AFNOR, 2006, which is the French National Annex to EN 1997-1). Indeed, DA 3 (with the factoring of soil parameters) corresponds more to the methods already recommended for reinforced earth and soil nailing, as well as to the traditional practice for slope stability analysis.

The work for the adaptation to EC7 is still in progress, as some choices are not finalised yet and/or some numerical values still need to be fixed. Six new standards will have to be issued soon in order to complement EC7-1 (see below). For deep and shallow foundations, the format and safety level will remain basically the same as the ones of document Fascicule 62-Titre V. For embedded walls (diaphragm and sheet pile walls), as no "unified" document existed so far, the new standard is being prepared from "scratch", but no real problem of adaptation of the present national practice seems to be encountered. For other structures (reinforced earth, soil nailing, etc.), the existing standards provide a sound basis for the new standards.

4. Comparative design using the three design approaches of EC 7-1

4.1. *Example of a comparative design*

The design of a simple strip footing (Figure 2) was chosen for the comparison of the three design approaches in EC 7-1. In this example, the design is based on the verification of the ground bearing resistance. In particular, it helps to see the differences between DA 2 and DA 2*, chosen respectively by France and by Germany. Assuming a constant characteristic permanent vertical load V_k, the variable horizontal load H_k is increased and the required width of the strip footing, B, is determined. In addition, it is assumed that the horizontal load has a lever of 4.0 m, resulting in a moment M_k of 4.0 × H_k at the base of the footing.

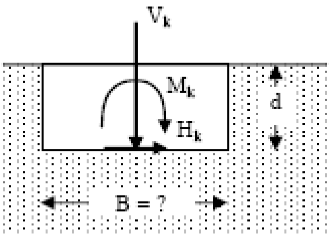

Figure 2. *Example of the design of a strip footing*

The following values are used in the calculations:

Embedment depth of the strip footing: d = 1.0 m
Permanent vertical load: V_k = 400 kN/m
Weight density of the soil: γ= 19.0 kN/m³
Angle of shearing resistance: φ'_k = 32.5°
Cohesion c'_k = 0
Structure-ground interface friction angle: $\delta_{S,k} = 2/3\ \varphi'_k$

The bearing capacity model given in DIN 4017-2 (1979) is used, which differs only slightly from the model given in Annex A of EC7-1. It is the classical analytical method using the shear strength parameters φ΄ and c' and the bearing factors N_c, N_q and N_γ often referred to as Terzaghi's method.

All the values of the partial factors recommended by EC7-1 are used for the three design approaches DA 1, DA 2-DA 2* and DA 3. For comparison with the traditional global safety concept, the value h = 2.00 is used, in accordance with the German standard DIN 1054 (1976).

Two comments should be made :

- the values of the partial factors recommended by EC 7 apply to any geotechnical model. In case the uncertainty on the model used is larger or lower than the model(s) for which it can be felt that the recommended values are meant for, EC 7 allows introducing a 'model factor' γ_{Rd} different from 1.0. In the following it is assumed that γ_{Rd} = 1.0;

- once a geotechnical model (and a value for γ_{Rd}) is (are) chosen, the comparison between the three Design Approaches does not depend directly on these choices, because it is only a matter of combinations of partial factors; it depends, of course, to a certain extent, on the relative magnitudes of the various actions and resistances.

4.2. *Design Approach DA 1*

For Combination 1 of the partial factors in Design Approach DA 1, it is generally not clear at the onset whether the vertical load, Vk, will be a favourable or an unfavourable load in the design. That is why two cases have to be investigated: one with a partial factor, $\gamma_{G,inf}$, of 1.0 on the permanent load and a second one in which γ_G is set at 1.35. The results of the calculation (verification of the ground bearing resistance) are shown in Figure 3. The verification of the resistance against sliding becomes relevant for the design when the ratio H_k/V_k is equal to or greater than 0.26. This results from the limit state condition for sliding in accordance with equation 6.2 of EC 7-1, disregarding the passive earth pressure at the vertical face of the footing and taking account of the fact that the vertical component, V_d, of the resultant force on the base of the footing is a favourable action in the verification of safety against sliding and must therefore be determined with a partial factor, $\gamma_{G,inf}$, of 1.00.

$$H_d = H_k \times \gamma_Q \leq R_d = V_d \times \tan \delta_{S,k} / \gamma_{R;h} = V_k \times \gamma_{G,inf} \times \tan \delta_{S,k} / \gamma_{R;h}$$

$$H_k/V_k \leq \gamma_{G,inf} \times \tan \delta_{S,k} / (\gamma_{R;h} \times \gamma_Q) = 0.26$$

In Combination 2 of the partial factors in Design Approach DA 1, the partial factors $\gamma_{\varphi'}$ and $\gamma_{c'}$ with a value of 1.25 are applied to the shear strength parameters of the ground (MFA approach) and a partial factor, γ_Q, of 1.30 is applied to the variable actions, which in this case is the horizontal load. It can be seen that, in this example, Combination 2 results in a significantly greater width for the strip footing than Combination 1. It will therefore be relevant for the design.

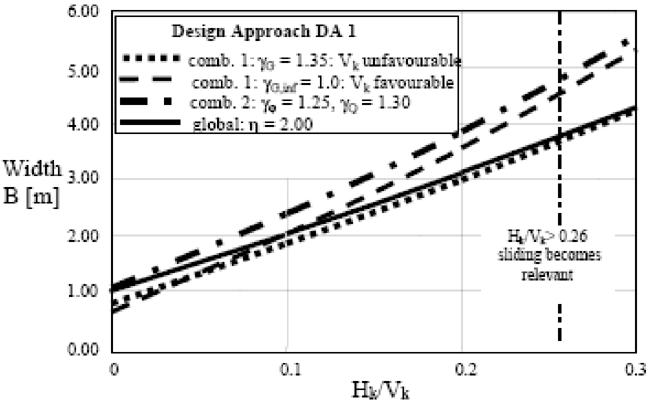

Figure 3. *Width, B, of the strip footing in Design Approach DA 1*

If the results of Design Approach DA 1 are compared with a design according to the previous global safety concept with a global safety factor, η, of 2.00 in accordance with the German standard DIN 1054 (1976), it can be seen that approximately the same footing width is only obtained in the two safety concepts when the horizontal load is zero. However, as the horizontal load increases, the required width of the strip footing will be up to 30 % greater than under the former global safety concept. Therefore, the previous safety level cannot be maintained by using Design Approach DA 1 together with the values of partial factors recommended by EC7-1, although this may be possible in certain load combinations.

4.3. *Design Approach DA 2 and DA2**

Figure 4 shows the results of Design Approach DA 2 in which the partial factors are applied to the actions at the beginning of the calculation, as well as to the resistances of the ground (RFA approach) when the limit state equation is checked (see Figure 1, left). As in the case of DA 1 Combination 1, it is generally not clear if V_k will be a favourable or an unfavourable load. Two cases have also to be investigated. In this design approach, the favourable vertical load becomes relevant for the design at a ratio, H_k/V_k, greater than 0.06. Compared to a design according to the former global safety concept with a global safety factor, h, of 2.00 of the German practice, this example only yields approximately the same footing width, B, when the variable horizontal load is zero. If the horizontal variable load increases, the required width of the footing will increase by up to 30 %.

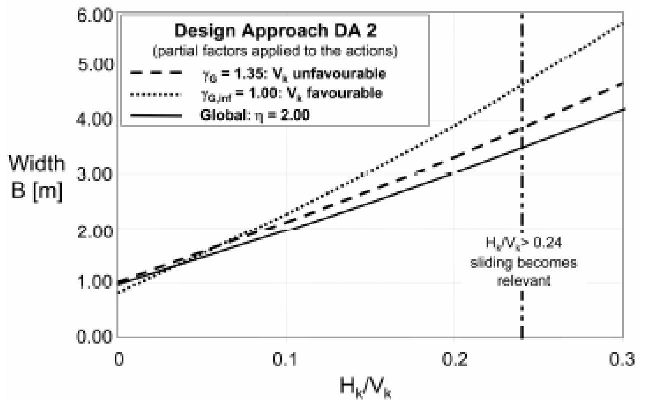

Figure 4. *Width, B, of the strip footing in Design Approach DA 2 where the partial factors are applied to the actions at the beginning of the calculation*

The results of Design Approach DA 2*, in which the partial factors are applied to the characteristic values of the effects of actions and resistances of the soil (RFA approach) all at the end of the verification when the limit state equation is checked (see Figure 1, right), are presented in Figure 5. It can been seen that an unfavourable permanent vertical load, V_k, with a partial factor, γ_G, of 1.35 is always relevant for the design and the required width, B, of the footing agrees very well with a design according to the tried and tested former global safety concept in which a global safety factor, η of 2.00 was applied. Thus, for Germany, the safety level of the former global safety factor concept can be maintained very well by using Design Approach DA 2*.

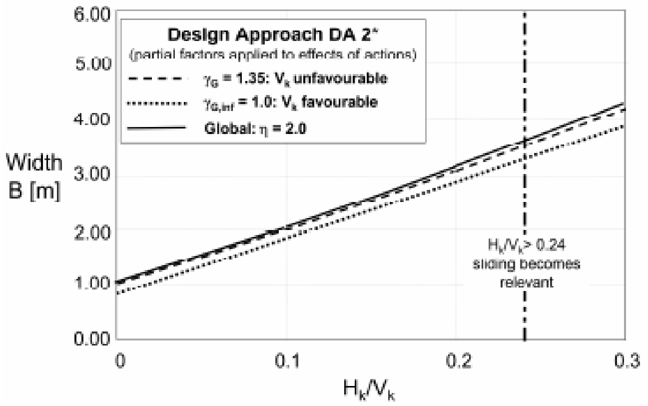

Figure 5. *Width, B, of the strip footing in Design Approach DA 2* where the partial factors are applied to the effects of actions at the end the calculation*

The reason for the great differences in the footing width, B, obtained by the two procedures DA 2 and DA 2* lies in the different ways in which the characteristic ground bearing resistance is determined. In procedure DA 2*, in which the partial factors are applied at the end of the verification, the characteristic ground bearing resistance is determined with the characteristic values of the effects of actions on the base of the foundation (Figure 6), i.e. the characteristic inclination, $\delta_{E,k}$, and the characteristic eccentricity, e_k, are used to determine the characteristic ground bearing resistance. In procedure DA 2, in which the partial factors are applied to the actions at the beginning of the calculation, the characteristic ground bearing resistance is determined with the design values of the effects of actions on the base of the foundation, i.e. the design value, $\delta_{E,d}$, of the inclination and the design value, e_d, of the eccentricity are used to determine the characteristic ground bearing resistance. This can be felt as incompatible with a logically structured safety philosophy. On the other hand, it can be seen as respecting the principle according to which that safety should be introduced, whenever possible, at the source of the uncertainty (here the loads). Now, as the partial factor for the variable actions, γ_Q, is greater than the partial factor for the permanent actions, γ_G, the eccentricity and the tangent of the inclination of the resultant effects of actions on the base of the foundation obtained by DA 2 will always exceed those obtained for DA 2* by a factor, γ_Q/γ_G, of 1.50/1.35, or 1.11. The effect is even greater if the vertical load acts favourably and the design value, V_d, has to be determined with the partial factor, $\gamma_{G,inf}$, set at unity. The eccentricity and the tangent of the inclination of the resulting effect of actions on the base of the foundation will then exceed those obtained for DA 2* by a factor, $\gamma_Q/\gamma_{G,inf}$, of 1.50/1.00, or 1.50.

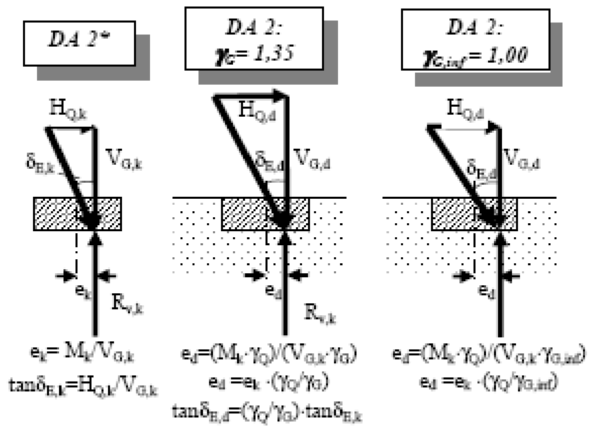

Figure 6. *Determination of the ground bearing resistance for a variable horizontal load in design approaches DA 2* and DA 2*

However, it must be pointed out here that different dimensions are only obtained for geotechnical engineering designs of shallow foundations according to Design Approaches DA 2 and DA 2* if the safety against bearing capacity failure is relevant to the design. As demonstrated above, this is because the resistance of the ground depends on the loads on the ground. Where this is not the case, such as in the design of piles, anchors and sheet-pile walls, the two design approaches will result in the same dimensions. The same applies if the verification of safety against sliding is relevant for the design of shallow foundations, although the magnitude of the resistance to sliding depends on the magnitude of the vertical load on the foundation base. The same results are obtained in this case because – as mentioned in section 4.2 above– the permanent vertical load acts favourably so that the design value, V_d, of the vertical load on the base must be determined with the partial factor, $\gamma_{G,inf,}$ set at unity. Thus the characteristic value of the vertical load on the base, V_k, is used to determine the sliding resistance, as it is in Design Approach DA 2*.

4.4. *Design Approach DA 3*

In Design Approach DA 3, the partial factors are applied at the source to the ground shear parameters and the effects of actions and resistances of the ground are calculated with design values of the shear parameters (MFA approach). The usual partial factors are applied to the actions coming from the structure. In this design approach, too, the designer does not usually know whether favourable or unfavourable permanent effects of actions will be relevant for the design. Therefore, two cases also have to be investigated for DA 3 (Figure 7). In this example, a favourable vertical load becomes relevant for the design at a ratio, H_k/V_k, greater than 0.08. When the results of Design Approach DA 3 are compared with a design according to the former global safety concept with a global safety factor, η, of 2.00 we find that approximately the same footing width is only obtained if the horizontal load is zero. However, as the horizontal load increases, the width, B, of the strip footing obtained in the calculations of the ground bearing resistance increases by up to 40 % compared with the former global safety concept. Thus the former safety level cannot be consistently maintained either when Design Approach 3 is applied to the design of shallow foundations together with the values of partial factors recommended by EC7-1.

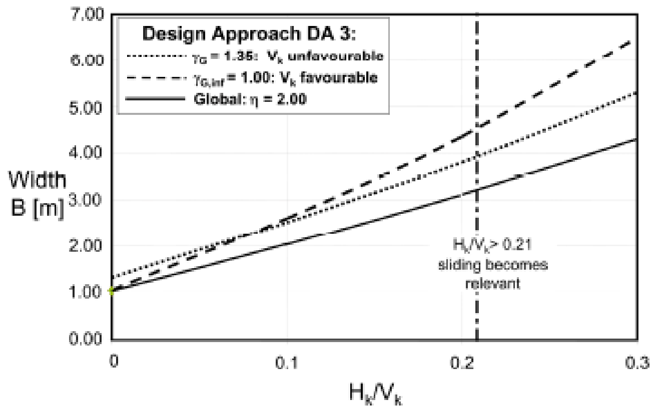

Figure 7. *Width, B, of the strip footing in Design Approach DA 3*

5. Choice of design approach and values of partial factors

5.1. *In Germany*

As the comparative calculations for a simple strip footing have clearly shown, Design Approach DA 2* is the only design approach by which the tried and tested safety level of the former global safety concept can be maintained for shallow foundations. Besides other fundamental theoretical objections to the other design approaches (Weißenbach, 1991 and 1998; Schuppener *et al.*, 1998; Weißenbach *et al.*, 1999; Schuppener & Vogt, 2005), it is essentially for this reason that the relevant standards committee in Germany decided to stipulate the use of DA 2* for the design of retaining structures, foundations, piles and anchorages in the new DIN 1054 *Ground - Verification of the safety of earthworks and foundations* (2005). Indeed, using equation [7], it is straightforward to determine the partial coefficients to be used for DA 2* whatever the geotechnical structure. Furthermore, no distinction between favourable and unfavourable permanent actions is necessary when using this procedure, except for tension pile groups where the permanent compressive effect of actions in the piles is factored by $\gamma_{G,inf}$ = 1.0 and the permanent tensile effect actions is factored by γ_G = 1.35. Apart from the exception referred to here, the assumption of unfavourable permanent actions and effects of actions is always relevant for design in DA 2*. The numerical values of the partial factors specified in DIN 1054 are the same as those recommended in Annex A of EC 7-1 (Table 2). The geotechnical limit states are referred to as "GEO-2" in the National Annex as they are verified by means of Design Approach DA 2.

5.2. *In France*

The National Annex for the application of Eurocode 7 – Part 1 in France has been published by AFNOR in 2006. As mentioned above, Design Approach 2 is recommended. In some cases, Design Approach 3 may also be used. Some final choices about the values of partial factors have not been made yet, but the intention is to keep as far as possible all the values recommended by Eurocode 7, especially for the loads coming or acting on the structure. AFNOR (2006) stipulates that: "*Unless different specifications are given in the national standards complementing Standard NF EN*

1997-1, the values of the partial factors applied to actions, material properties and resistances for the design of geotechnical structures, are those recommended in Annex A of standard NF EN 1997-1:2005." In order to keep the same overall levels of safety, presently accepted, some values for the resistance factors γ_R will have to be slightly modified and/or some 'model' factors γ_{Rd} will be introduced. The present situation is summarised in Table 3.

Table 2. *Limit states and partial factors of DIN 1054 (2005)*

Design Approach EC 7-1	Design Approach DIN 1054	Actions or effects of actions of the structure	Actions or effects of actions of the ground	Resistance of the ground
GEO DA 2*	GEO-2: verification of shallow foundations, retaining structures	$\gamma_G = 1.35$; $\gamma_Q = 1.50$		$\gamma_{R;e} = \gamma_{R;v} = 1.40$ $\gamma_{R;h} = 1.10$
	GEO-2: verification of piles and anchors			$\gamma_{Pc} = 1.20$ $\gamma_{Pt} = 1.30$ $\gamma_P = 1.40$ $\gamma_A = 1.10$
GEO DA 3	GEO-3: verification of slope stability	$\gamma_G = 1.00$ $\gamma_Q = 1.30$	$\gamma_\varphi = \gamma_c = \gamma_{cu} = 1.25$	

γ_{Pc}: partial factor for compressive piles from pile load test results; together with correlation factors $1,00 \le \xi \le 1.15$;
γ_{Pt}: partial factor for tensile piles from pile load test results; together with correlation factors $1,00 \le \xi \le 1.15$;
γ_P : partial factor for compressive and tensile piles obtained from ground test results and comparable experience;
γ_A : partial factor for the pull-out resistance of the grouted body

Table 3. *Partial factors for GEO-Ultimate Limit states (ULS) in permanent and transient design situations according to French AFNOR standards*

DA in EC 7-1	Standard NF P 94-xxx on [1] under preparation	Actions or effects of actions of the structure	Actions or effects of actions of the ground	Resistance of the Ground
DA 2	-shallow foundations[1] -gravity walls[1] -embedded walls[1] -composite retaining structure[1]	$\gamma_G = 1.35$; $\gamma_Q = 1.50$	active pressure $\gamma_G = 1.35$ $\gamma_Q = 1.50$	$\gamma_{R;e} = 1.40$ $\gamma_{R;h} = 1.10$ $\gamma_{R;v} = 1.40$*
	- deep foundations[1] - anchors[1]	$\gamma_G = 1.35$; $\gamma_Q = 1.50$	downdrag lateral thrusts $\gamma_G = 1.35$ $\gamma_Q = 1.50$	$\gamma_t = 1.10$* $\gamma_{st} = 1.15$* $\gamma_{a;p} = \gamma_{a;t} = 1.10$* together with $\gamma_{R;d} \geq 1.0$ and $\xi \geq 1.0$
DA 2 or DA 3	- earth structures[1]	$\gamma_G = 1.35$; $\gamma_Q = 1.50$	$\gamma_E = 1.35$	$\gamma_{R;e} = 1.10$
		$\gamma_G = 1.35$; $\gamma_Q = 1.50$	$\gamma_\varphi = \gamma_c = 1.3$ to 1.5 or $\gamma_{cu} = 1.50$	

*under discussion, to be adapted with SLS
γ_t: partial factor for compressive piles from pile load test or ground test results
γ_{st}: partial factor for tensile piles from pile load test or ground test results
$\gamma_{a;p}$: partial factor for the pull-out resistance of the grouted body of permanent anchors
$\gamma_{a;t}$: partial factor for the pull-out resistance of the grouted body of temporary anchors
$\gamma_{R;d}$: model factor for pile and anchor resistances
ξ : correlation factors for pile and anchor resistances

The six new standards for complementing EN 1997-1 are the following:

Pr NF P 94 261 : Shallow foundations;

Pr NF P 94 262 : Pile foundations;

Pr NF P 94 270 : Reinforced embankments and soil nailing;

Pr NF P 94 281 : Retaining structures (walls);

Pr NF P 94 282 : Retaining structures (embedded walls and anchors);

Pr NF P 94 290 : Earth structures.

It is planned to have them ready in 2007-2008.

6. Conclusions

The selection of the partial factors and the design approach in Germany was based on the principle that the safety level of the former global safety concept should be more or less maintained when the concept of partial factors was introduced with the Eurocodes. A design according to EC 7-1 should result in roughly the same dimensions for retaining structures and foundations as a design according to the standards used in the past.

The comparative design calculation for a strip footing with eccentric and inclined loads showed that the safety level of the former global safety concept can only be maintained by using Design Approach DA 2* in which the partial factors are introduced at the end of the calculation when the limit state equation is checked. It is the same for retaining walls, piles and anchors. Therefore, DIN 1054 (2005) specifies DA 2* as the mandatory design procedure for retaining walls, shallow foundations, piles and anchors in Germany.

Moreover, the comparative designs showed that Design Approach DA 2*****, when compared to the other Design Approaches, provides the most economic design for shallow foundations with eccentric and inclined loads where the bearing capacity is relevant for design and when the values of the partial factors recommended by Eurocode 7 are used. The other design approaches result in strip footings with a width, B, which is up to 40 % greater. DA 2* compares well with the traditional global factor design procedure for shallow foundations.

Design Approach DA 3 is specified for the verification of slope stability in DIN 1054 (2005) as a similar approach was previously used in the global safety concept.

In France, the idea was also to change the dimensions of the foundations and retaining structures as little as possible. Limit state design with partial factors has started to be used in geotechnical design for nearly 30 years now. Thus, the adaptation to the concepts of Eurocode 7 poses no serious problems, as it is very consistent or near the present French practice for most geotechnical problems. Only some resistance or 'model' factors need to be adjusted. The (resistance) 'model' factors also allow to take into account the differences which might be brought by the use of various geotechnical models (calculation methods).

In France, Design Approach 2, with the partial factors introduced at the source for the actions, and on the total resistance at the end, is recommended for most structures. Design Approach 3 may also be used, in particular for checking slope stability.

It should be stressed that DA 2 and DA 2* are most often identical. In contrast with Design Approach 1, only one combination of partial factors is required (except in special cases where it is not evident if some actions are favourable or unfavourable). Both DA 2 and DA 2* are "resistance factor" approaches, i.e. a unique factor is applied on the total ground resistance.

The final design of many geotechnical structures depends also on the serviceability criteria. They often have to resist accidental actions, as well. The corresponding verifications were not treated in this paper which was limited to the check of ultimate limit states in persistent and transient design situations.

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2011 Japan Earthquake
ASCE Embankment, Dams and Slopes Committee Team Reports

Binod Tiwari, Daniel Pradal, and Joseph Wartman

The Embankment, Dams and Slopes (EDS) Committee of the Geo-Institute Team arrived in Japan on April 23, 2011 for a one-week engineering reconnaissance of the region affected by the Tohoku Japan Earthquake. The three-person team is led by Joseph Wartman of the University of Washington; it includes Binod Tiwari, of California State – Fullerton, and Daniel Pradal of Praad Geotechnical Inc. and the University of California - Los Angeles.

The EDS/G-I team is being hosted by Professor Keizo Ugai, president of the Japanese Landslide Society and a Professor at Gunma University. The team is also working with the Japanese Geotechnical Society. Team members will be also posting updates to the ASCE web site throughout the week.

Report 1: April 25, 2011

Our team spent the last two days visiting the Fukushima region in the company of Professors Ugai and Wakai of the Japanese Landslide Society and Gunma University. The Fukushima Prefecture (administrative subdivision) is located 4 hours north of Tokyo and about a hundred kilometers from the earthquake epicenter.

Despite having suffered high levels of ground shaking (up to ~ 0.7 g), there is surprisingly little damage to buildings and major structures such as bridges; earth structures such as embankments, levees, and retaining walls generally appear to have performed well in the areas we visited. We have been impressed with the resiliency of the transportation networks, which appear to be functioning at nearly full capacity. These observations very like reflect to some degree the stringent building codes used in Japan and the excellent quality of construction works.

We have visited several landslides - some very large - that have impacted smaller secondary roads. The figure below is an example of one such landslide of at least several hundred square meters in area.

Interestingly, some of the landslides we visited were reportedly triggered not by the main shock on March 11, but several weeks later by a shallow M 7.0 earthquake thought to be related to the larger subduction event. This shallow earthquake resulted about 1 m of mostly vertical surface fault rupture (second photo below) several km in length. The fault rupture offset roads, drainage culverts, and at some isolated located, buildings.

We will be continuing north from here to the Sendai region in the coming days.

Report 2: April 27, 2011

The G-I/EDS team has been traveling throughout the general Fukushima region over the past two days. Owing to its very large magnitude, the mesoseismal area of the earthquake (i.e., region experiencing strong ground shaking) is enormous and presents both a challenge and an opportunity for our engineering reconnaissance. The challenge is trying to optimize the reconnaissance so that we can cover as much ground as needed in a limited amount of time (and, before cleanup and repair efforts obscure the damage mechanisms). Our Japanese colleagues have been extraordinarily helpful in this regard, as they have already visited many of the sites of interest and have been able to show us those that are the most significant.

The unique opportunity that the large magnitude earthquake provides is the chance to witness the effects of strong ground shaking on a wide range of geotechnical systems situated in a variety of geological settings.

Fukushima Dam Failure

Today we visited the site of the Fukushima Dam, which catastrophically failed during the earthquake, tragically killing 12 residents of a nearby town (Figure 1). The 17-m dam impounded water used for agricultural purposes. In addition to the dam failure, we were actually able to view instability in some of the slopes surrounding the reservoir during our visit. It is not clear why the dam failed, but this will undoubtedly be the topic of future forensic investigations.

Figure 1. Site of the Fukushima Dam failure.

A Road Embankment Failure

While road infrastructure typically performed very well in this region, we visited one large failure yesterday where a portion of road embankment slid several tens-of-meters downslope. The failure (Figure 2) appears to have involved a wedge of fill that was placed to grade the road.

Figure 2. Road embankment failure.

A Long-Runout Event

We have also visited several landslides in natural or modified terrain, including one long-runout event shown in Figure 3 that impacted three houses. This landslide was not triggered by the main shock, but instead by the April 11 shallow event described in the previous posting. The landslide killed several people in the homes.

Report 3: April 29, 2011

Days 5 and 6 -- Thursday, April 28 and Friday, April 29 as Reported by Daniel Pradal

On Wednesday, April 27, the team was split into two groups to cover more terrain, since the region that experienced strong ground shaking on March 11, 2011 is enormous. Â While Joe and Binod were visiting sites around Sendai, I was visiting levees and embankments in the Tokyo Bay and Kanto plain, north of Tokyo. The visits were organized by Professors Ishihara from Chuo University and Tsukamoto from the Science University of Tokyo. Our Japanese hosts were extraordinarily helpful and gracious. The visits provided me a unique opportunity to witness the widespread effects of liquefaction on levees, embankments, retaining walls, and residences.

Figure 3. Landslide striking several homes.

On Thursday, I visited sites along Tokyo Bay in and around Makuhari, in Chiba prefecture. Damage from liquefaction including lateral spread (Figure 1), post-liquefaction settlement (Figure 2) and retaining wall failures (Figure 3) were obvious along river embankments and canals. Although, settlement often exceeded 30 cm (1-foot), most structures did not appear to have experienced structural distress (Figure 4).

Figure 1: Damage from liquefaction including lateral spread.

Figure 2: Post-liquefaction settlement.

Figure 3: Retaining wall failures.

Figure 4: No structural distress found in most structures.

On Friday, I visited several levees that were affected by liquefaction along the Tone river. Although, extensive emergency repairs have and are being made in preparation for the rainy season (which starts in May), numerous sand boils were still visible along the toe of many levees (Figures 5 and 6) on both the upstream and downstream faces. Liquefaction resulted in lateral spread which created deep fissures between the Tone River and the toe of levees. At bridge abutments, evidence of lateral spread exceeding 1.5 m (5-feet) was visible. Additionally, deep cracks up to 30 cm wide (1-foot) were still present on the upstream face (river side slope) of several levees (Figures 7 and 8).

Figure 5. Sand boils along the toe of levee.

Figure 6. Sand boils along the toe of levee.

Figure 7. Deep cracks on upstream face of levee.

Figure 8. Deep cracks on upstream face of levee.

Several failures along the steeper downstream face were also visible, including one that damaged structures along the toe of the levee (Figure 9). I also visited Fuda, a small village along the Tone River, where extensive damage related to liquefaction was reported. Evidence of subsidence exceeding 45 cm (1.5-feet) was visible at several locations (Figures 10 and 11). Although, settlement was extensive, most structures appear to have experienced only structural distress.

Figure 9. Failure along downstream face damages structure along toe of levee.

Figure 10. Evidence of subsidence exceeding 45 cm.

Figure 11. Evidence of subsidence exceeding 45 cm.

Figure 12. Some structural distress.

ΔΙΑΚΡΙΣΕΙΣ ΕΛΛΗΝΩΝ ΓΕΩΜΗΧΑΝΙΚΩΝ

Παύλος Μαρίνος

Ο Ομότιμος Καθηγητής του ΕΜΠ Παύλος Μαρίνος ανηγορεύθη Επίτιμος Διδάκτωρ του Δημοκριτείου Πανεπιστημίου Θράκης. Σημειώνεται ότι ο Παύλος Μαρίνος ξεκίνησε την καθηγητική του σταδιοδρομία στην Πολυτεχνική Σχολή του Δημοκριτείου Πανεπιστημίου Θράκης το 1977 διδάσκοντας Τεχνική Γεωλογία μέχρι το 1987, οπότε εξελέγη καθηγητής στο ΕΜΠ.

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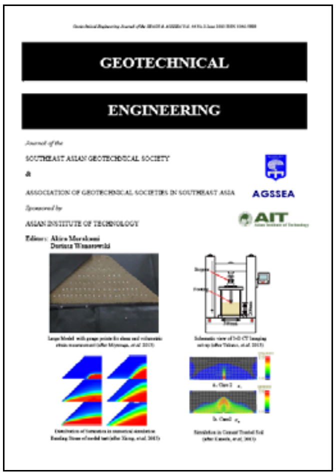

Dear Friends,

We intend to have three contributed Issues of our Journal in 2015. Each Issue will have about ten articles. We should be most grateful if you can contribute articles and also encourage others to do so. Please give us your kind support.

You may wish to help us by suggesting good conferences from where we can screen good articles to be considered for our Journal.

Good Wishes

Prof. A. S. Balasubramaniam

http://www.seags.ait.ac.th, http://www.agssea.org

ΠΡΟΣΕΧΕΙΣ ΕΚΔΗΛΩΣΕΙΣ ΓΕΩΤΕΧΝΙΚΟΥ ΕΝΔΙΑΦΕΡΟΝΤΟΣ ΣΤΗΝ ΕΛΛΑΔΑ

ΕΕΜΦ GCOLD

2ο 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 υδροφορέων 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

- Υλικά κατασκευής φραγμάτων - Μέθοδοι κατασκευής - Νέες τεχνικές
- Εκτίμηση, επιλογή και αναθεώρηση πλημμυρών σχεδιασμού
- Σχεδιασμός και αναβάθμιση υπερχειλιστών
- Έργα στεγάνωσης και αποστράγγισης φράγματος και θεμελίωσης
- Η επιρροή των γεωλογικών συνθηκών στον σχεδιασμό
- 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
- Αποτίμηση της διακινδύνευσης φραγμάτων (risk assessment)
- Δημόσιοι και ιδιωτικοί φορείς εμπλεκόμενοι στη διαχείριση φραγμάτων – θέματα οργάνωσης και τεχνικής ικανότητας
- Κίνδυνοι σχετιζόμενοι με προβλήματα οργάνωσης του κυρίου - διαχειριστή του έργου
- Απαιτήσεις παρακολούθησης συμπεριφοράς
- Ασφάλεια ταμιευτήρα (ευστάθεια πρανών, 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
- Περιορισμός υδρομορφολογικών αλλοιώσεων και αισθητική αποκατάσταση περιβάλλοντος
- Αρχιτεκτονικός σχεδιασμός φραγμάτων και συναφών κατασκευών
- Τα φράγματα ως μέρος της πολιτιστικής κληρονομιάς
- Εμπλουτισμός και αποκατάσταση υπόγειων υδροφορέων - Δημιουργία υγροβιότοπων κ.λπ.
- 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, τοτ. 210 - 5241223, Η/Δ : eemf@eemf.gr, www.eemf.gr

6° ΠΑΝΕΛΛΗΝΙΟ ΣΥΝΕΔΡΙΟ ΛΙΜΕΝΙΚΩΝ ΕΡΓΩΝ
Αθήνα 11 - 14 Νοεμβρίου 2013

Το Εργαστήριο Λιμενικών Έργων του Ε.Μ.Π. διοργανώνει το 6° ΠΑΝΕΛΛΗΝΙΟ ΣΥΝΕΔΡΙΟ ΛΙΜΕΝΙΚΩΝ ΕΡΓΩΝ. Θα πραγματοποιηθεί στην Αθήνα στις 25 - 28 Νοεμβρίου 2013.

Αντικείμενο του Συνεδρίου είναι η παρουσίαση των νεοτέρων εξελίξεων στο χώρο των επιστημών και των τεχνολογιών που σχετίζονται με τα Λιμενικά Έργα και ειδικότερα την έρευνα, τον σχεδιασμό, την μελέτη, κατασκευή, προστασία, συντήρηση, διαχείριση, στις επιπτώσεις στο περιβάλλον καθώς και η ενημέρωση, η ανταλλαγή απόψεων και η προώθηση της τεχνογνωσίας στους τομείς αυτούς. Στόχος του είναι η ενημέρωση, η ανταλλαγή απόψεων και η προώθηση της τεχνογνωσίας.

Απευθύνεται στους ερευνητές, μελετητές, κατασκευαστές, ΑΕΙ, δημόσιους φορείς, ΟΤΑ, Ο.Λ., Λιμενικά Ταμεία, περιβαλλοντικές οργανώσεις και υπηρεσίες που ενδιαφέρονται και ασχολούνται με τα Λιμενικά Έργα, τους οποίους και προσκαλεί να παρουσιάσουν το έργο και τις εμπειρίες τους.

Θεματολόγιο

- Περιβαλλοντικά μεγέθη σχεδιασμού και κατασκευής λιμενικών έργων
- Σχεδιασμός λιμένων, μελέτη και κατασκευή λιμενικών έργων
- Χωροθέτηση λειτουργιών, διαμόρφωση λιμενικής ζώνης
- Αστοχίες, βλάβες λιμενικών έργων. Επιθεώρηση, αποκατάσταση, συντήρηση
- Μελέτη λιμένων σε φυσικό προσομοίωμα
- Περιβαλλοντικές επιπτώσεις από την κατασκευή και λειτουργία λιμένων
- Το Ελληνικό Λιμενικό Σύστημα υπό το πρίσμα της Ευρωπαϊκής οικονομικής κρίσης
- Διαχείριση, διοίκηση, λειτουργία λιμένων. Θεσμικό πλαίσιο. Ιδιωτικοποιήσεις δραστηριοτήτων.

Οι ενδιαφερόμενοι για περισσότερες πληροφορίες μπορούν να απευθύνονται στο Εργαστήριο Λιμενικών Έργων Ε.Μ.Π. τηλ.: 210.7722367, 210.7722375, 210.7722371, fax: 210.7722368 (κες Θ. Γιαντσή, Ι. Φατούρου).

e-mail: lhw@central.ntua.gr

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

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

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

The theme of EETC2014 Athens is:

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

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

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

TOPICS:

- Innovative methods for Analysis and Design
- Tunnelling in difficult ground conditions
- Conventional urban or shallow tunnelling
- Mechanized tunnelling
- Hydraulic tunnels
- Underground complexes
- Caverns for Hydropower or Storage
- Pipe jacking and microtunnelling
- Innovations in tunnelling construction technology
- Tunnels and shafts for mining
- Rehabilitation and repair
- Safety and security in tunnels and tunnelling
- Contractual and financial issues
- Education and training
- Case histories
- Underground space use
- Tunnels and monuments

ΠΡΟΣΕΧΕΙΣ ΓΕΩΤΕΧΝΙΚΕΣ ΕΚΔΗΛΩΣΕΙΣ

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

PILE 2013 International Conference on "State of the Art of Pile Foundation and Pile Case Histories, Bandung, Indonesia, June 2-4, 2013, www.pile2013.com

The first international conference on Foundation and Soft Ground Engineering: Challenges in Mekong Delta, 5-6 June, www.ictdmu.com

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

The Airfield & Highway Pavement Conference, June 9-12, Los Angeles, USA, http://content.asce.org/conferences/pavements2013/index.html

International RILEM Symposium on Multi-Scale Modeling & Characterization of Infrastructure Materials, 10-12 June 2013, Stockholm, Sweden, www.rilem2013.org

COMPDYN 2013 4th International Conference on Computational Dynamics & Earthquake Engineering, 12 – 14 June 2013, Kos Island, Greece, http://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 In honour of Prof. Kenji Ishihara, 17 - 19 June 2013, Istanbul, Turkey, www.icege2013.org

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

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

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.ege13.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

International Symposium & 9th Asian Regional Conference of IAEG Global View of Engineering Geology and the Environment, 24 - 25 September, 2013, Beijing, China, www.iaegasia2013.com

25 - 26 September, 2013, Kuala Lumpur, Malaysia
www.pilingdeepfoundationsasia.com

Complex geotechnical conditions and existing dense urban development are challenging the otherwise increasing scope and size of urban construction projects in South and South East Asia.

Rendering 'transparent ground' has become an absolute must for project owners and construction contractors as inadequately investigated ground conditions will lead to costly delays, litigation and even unexpected structural failure.

Efficient ground investigation, adequate condition assessment of structures, suitable substructure design and cost effective pile/foundation construction will address these issues and will vastly improve the quality of urban underground construction.

Piling & Deep Foundations Asia will bring together experts from project owners, main contractors, geotechnical consultants and piling contractors to discuss trends in geotechnical design, piling and foundation engineering, substructure construction and new materials.

Questions? Contact us at +65 6722 9388 or email enquiry@iqpc.com.sg

Sardinia_2013 14th International Waste Management and Landfill Symposium, 30 September – 4 October 2013, Sardinia, Italy, www.sardiniasymposium.it

HYDRO 2013 International Conference and Exhibition Promoting the Versatile Role of Hydro, 7 to 9 October 2013, Innsbruck, Austria, www.hydropower-dams.com/hydro-2013.php?c_id=88

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

The 5th International Conference on Geoinformation Technologies for Natural Disaster Management (GiT4NDM 2013)
October 9 – 11, Ontario, Canada
www.igrdg.com/5thGiT4NDM.php

The 5th International Conference on Geoinformation Technologies for Natural Disaster Management (GiT4NDM 2013) will be jointly organized by the Waterloo Institute for Disaster Management (WIDM) and Dewey College in Mississauga, Ontario, Canada from October 9 to 11, 2013. This three-day event including one day social tour is co-sponsored by the International Cartographic Association (ICA) Commission on Mapping from Remote Sensor Imagery, the International Association of Geodesy (IAG) Joint Working Group on 0.2.1 on New Technologies for Disaster Monitoring and Management, the International Society for Photogrammetry and Remote Sensing (ISPRS) Working Group I/6 on Mobile Scanning and Imaging Systems, the International Federation of Surveyors (FIG) Working Group 4.4 on Maritime and Marine Spatial Information Management and the International Association of Geo-information & Communication Technology (AGeoICT) Working Group on Geomatics for Disaster Management. The goal of the conference is to contribute the recent knowledge among the local and international participants in both geomatics community and disaster management community. GiT4NDM 2013 aims at bringing together academics, researchers, scientists, industrialists, politicians and practitioners. The conference will provide a platform to discuss recent technical advancements and innovations in geospatial information and communication technologies as well as their innovative applications in disaster management. The theme for GiT4NDM 2013 event is "Save the Earth with Informed Solutions". This two-day event will consist of keynote sessions, parallel technical sessions, panel sessions, and an industrial/educational exhibition.

In addition, we have a pre-conference workshop on Open Source Hands-on GIS workshop for Disaster management using QGIS and GRASS on October 8, 2013 by Prof. Scott Madry from the University of North Carolina, USA.

Theme "Save the Earth with Informed Solutions"

Topics

- New generation of earth observation systems for natural hazard monitoring
- UAV-based monitoring for immediate hazard mapping and damage assessment
- Laser scanning for 3D indoors modeling and evacuation simulations
- Web based multidimensional GIS for disaster risk management
- Multisensor integration for monitoring marine disasters (i.e. oil spill, tsunamis, tornados, red tide)
- Terrestrial meteorological disasters (i.e. floods, snowstorm, drought, etc.)
- Monitoring and managing geological disasters (i.e. landslides, debris flow, earthquakes)
- Intelligent mobile sensor networks for agricultural and ecological disasters
- Mobile mapping for transportation emergency response and disaster management
- Remote sensing data processing and analysis techniques in natural disasters monitoring
- New geospatial technologies in early warning, forecasting and monitoring of natural hazard chains
- Public participation GIS for emergency warning, preparedness and planning

Contact IGRDJ

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Fax: +1 905-897-6662
Cell: +1 416 835 5930

The 1st International Symposium on Transportation Soil Engineering in Cold Regions - A Joint Conference with the 10th SHAHUNIANTS Lecture, October 10-11, 2013, Xining, China, http://subgrade.sinaapp.com

International Symposium on Design and Practice of Geosynthetic-Reinforced Soil Structures, 13-16 October, 2013, Bologna, Italy, www.civil.columbia.edu/bologna2013

The Mediterranean Workshop on Landslides: Landslides in hard soils and weak rocks - an open problem for Mediterranean countries, 21 and 22 October, 2013, Naples, Italy, www.mwl.unina2.it

International Conference Geotechnics in Belarus: Science and Practice, 23-25 October 2013, Minsk, Belarus, geotechnika2013@gmail.com belgeotech@tut.by

Problems and experience of the engineering protection of the urbanized territories and a safeguarding of the heritage under conditions of the geo-ecological risk, 5-7 November 2013, Kyiv, Ukraine, http://new.sophiakievska.org/en

☙ ❧

17th World Meeting & Exhibition
November 9 - 13, 2013, Riyadh, Saudi Arabia
www.IRF2013.org

Roads play a vital role in the economic development of all nations. It is a well-established fact that a poor road network hampers economic and social progress; therefore, in these challenging economic times, investments in the road sector can benefit the whole of society by providing access to markets, jobs, education, healthcare and other services, by lowering the cost of moving goods, and – my personal passion – by saving lives and avoiding injuries in unnecessary accidents.

The 17th IRF World Meeting will provide a unique forum for sharing the latest industry technologies, solutions and best practices from all over the world. Delegates will exchange knowledge and take it back to their respective countries for the benefit of their industry and societies. I will be honored by your participation in the premiere global surface transportation event of 2013!

THEMES AND SUBTHEMES

1. Transport Policy & Economics
1.1 Roads and society
1.2 Quantifying the impacts of infrastructure investment
1.3 Multimodalism / transport modes working together
1.4 Best practices in transport governance
1.5 Collaboration across borders
1.6 Transport & land use management
1.7 Education: preparing the next generation of transportation engineers

2. Road Safety
2.1 Road safety policies and global road safety programs
2.2 Identifying high risk roads
2.3 Road safety audits
2.4 Assessing the effectiveness of road safety measures
2.5 Safer roads for all users
2.6 Designing safer roadsides
2.7 Safety on urban roads
2.8 Safety on rural roads
2.9 Work zone safety
2.10 Flagger technologies and training
2.11 Emerging traffic safety issues
2.12 Speed enforcement and red-light running

3. Pavements & Materials
3.1 Long term pavement performance
3.2 Flexible pavement design
3.3 Asphalt: new methods and concepts
3.4 Advances in concrete pavement design
3.5 New techniques of soil-rock mixtures, roadbases, and subbases
3.6 Innovation in quality control

4. Sustainable Transport
4.1 Environmental evaluation of highway programs
4.2 Noise avoidance and mitigation strategies
4.3 New techniques in energy and resources savings
4.4 Environmental impact mitigation
4.5 Building resilient road networks
4.6 Road materials recycling

5. Integrated Mobility & ITS
5.1 Future of automobile transport
5.2 Intelligent infrastructure
5.3 Exploiting the potential of GNSS (global navigation satellite system)
5.4 Re-inventing car sharing and car pooling
5.5 Managing mobility in megacities
5.6 Future of freight transport
5.7 Case studies in regional ITS deployment
5.8 Innovation and standardization
5.9 Intermodalism and ITS
5.10 ITS for special events
5.11 Traffic management / traffic calming
5.12 The interoperability challenge
5.13 ITS architecture / standards setting and adoption

6. Transport Security / Disaster Mitigation & Recovery
6.1 Risk management in road operations
6.2 Critical infrastructure protection against human threats
6.3 Natural disaster mitigation
6.4 Natural disaster recovery
6.5 Crowd safety and control
6.6 Hajj Season (Pilgrimage to Mecca) planning and management

7. Asset Management
7.1 Management of road infrastructure assets
7.2 New approaches to performance delivery
7.3 Road maintenance policies and programs
7.4 Pavement preservation treatments and practices
7.5 Seasonal maintenance

8. Road Construction & Operations
8.1 Innovation in road project delivery: reducing construction time and cost
8.2 Traffic forecasting
8.3 Addressing exceptional geological and weather conditions
8.4 Innovation in communications: engaging the client and the user
8.5 Innovation in the construction and maintenance of unpaved roads
8.6 Rural and low-volume roads: case studies and innovation

9. Tunnel Construction & Operations
9.1 Advances in tunneling construction
9.2 Tunnel program delivery
9.3 Safety in road tunnels
9.4 Urban and micro tunneling

10. Public Private Partnerships & Road Financing
10.1 Road financing policy
10.2 Innovations in PPPs
10.3 PPPs for urban road network
10.4 Lessons learned from road user charging schemes

11. Urban and Public Transport
11.1 Subways
11.2 Light rail
11.3 Bus rapid transit (BRT)
11.4 Urban transport solutions & case studies
11.5 New technologies & innovation in public transport

General Information

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11 - 13 November, 2013 - Doha, Qatar
www.bridgesme.com

The 6th Annual Bridges Middle East Co-located with Tunnels Middle East is taking place this year from 11-13 November 2013 in Doha, Qatar. This international forum and exhibition will be dedicated to **showcasing state-of-the-art technology and methods for bridge and tunnel design, construction and maintenance**. The summit offers a platform for all stakeholders within the bridge and tunnel project value chain, from planning and design, to construction and procurement, to maintenance and asset management, to discuss and gain in-depth information about international best-practice methods for maximising the life-span of structures.

You will have the opportunity to meet and hear from industry experts, including:

- National government agencies (transport, public works / planning authorities)
- Municipalities
- Architectural firms
- Contractors
- Consultancy firms
- Material / technology suppliers

Contact us on +971 4 364 2975 or email enquiry@iqpc.ae.

6° ΠΑΝΕΛΛΗΝΙΟ ΣΥΝΕΔΡΙΟ ΛΙΜΕΝΙΚΩΝ ΕΡΓΩΝ, Αθήνα 11 - 14 Νοεμβρίου 2013, lhw@central.ntua.gr

GEOMATE 2013 3rd International Conference on Geotechnique, Construction Materials & Environment, November 13-15, 2013, Nagoya, Japan, www.geomat-e.com

International Conference Built Heritage 2013 - Monitoring Conservation Management, 18-20 November 2013, Milano, Italy, www.bh2013.polimi.it

GEOAFRICA2013 Geosynthetics for Sustainable Development in Africa - 2nd African Regional Conference on Geosynthetics, 18-20 November 2013, Accra, Ghana, http://geoafrica2013.com

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

International Conference on Geotechnics for Sustainable Development, 28-29 November 2013, Hanoi, Vietnam, www.geotechn2013.vn

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

10-11 December 2013, Dubai, United Arab Emirates
http://uae-atc2013.com

The UAE Society of Engineers would like to cordially invite you to the 1st Arabian Tunnelling Conference (ATC 2013) which is to be held in Dubai, United Arab Emirates from the 10th – 11th December 2013. This prestigious conference is the first ever ITA event to take place in the Middle East and North Africa region. Dubai is fast becoming the new capital of the world, its population having doubled in the last decade due to the meticulous planning and execution of its ever-growing infrastructure.

A multitude of cutting edge engineering projects have been undertaken in Dubai – from building the palm island to constructing the tallest building in the world, as the city grows into a mega-city the use of underground space as a sustainable development solution for urban mode of life comes to the fore. The theme of this year's conference is 'Sustainable Tunnelling in the GCC, Challenges and Opportunities'.

The conference program will explore the challenges facing the GCC region in implementing and preparing all types of underground projects. The program will also focus on the opportunities that the GCC region has to use underground space sustainably.

We shall strive to develop a culturally rich social program during the conference, whereby delegates will be able to see, hear and taste the unique Arabian culture and warm hospitality. We look forward to seeing you all in Dubai.

The Conference Theme is *"Sustainable Tunnelling in GCC (Challenges and Opportunities)"* and will cover the below subject areas:

1. Micro Tunnelling
2. Sustainable Tunnelling
3. Tunnelling Structures
4. Contracts and Risk Management
5. Tunnelling in GCC
6. Safety in Tunnelling

The conference program content covers a wide variety of topic areas relevant to the profession.

1. Site Investigation and Monitoring
2. Planning and Design of Underground Structures
3. Learning from Case Histories
4. Tunnels and Underground Structures for Storage
5. Tunnel Operation, Safety, Maintenance, Rehabilitation, Renovation and Repair
6. Innovations in Mechanized Tunnelling
7. Innovations in Conventional Tunnelling
8. Innovations in Cut and Cover and Immersed Tunnelling
9. Innovations in Materials
10. Design and Construction of Shafts
11. Risk Management, Contractual and Insurance Aspects

12. Tunnelling in GCC
13. Micro Tunnelling
14. Safety During Construction
15. Lifecycle Underground Facilities Management

For further information please contact:

Meeting Minds – Experts

Professional Conference Organizers
Email: pco@uae-atc2013.com
Dubai Media City | Shatha Tower | Office Suite 3113
P.O.Box 502464 | T: 971 4 4270492 | F: 971 4 4270493

The Conference Secretariat
pco@uae-atc2013.com

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

CPT'14 3rd International Symposium on Cone Penetration Testing, 13-14 May 2014, Las Vegas, Nevada, U.S.A., www.cpt14.com

www.dfi-effc2014.org

The European foundation community has spent many years and millions of Euros developing design and execution codes for foundation works. These codes are a remarkable industry contribution that promotes standardization and harmonization of execution procedures throughout Europe. Recognizing the significant resources dedicated to code writing and implementation efforts, this conference will explore the impacts of execution codes on foundation practice. International foundation industry specialists at the DFI-EFFC International Conference on Piling & Deep Foundations will discuss and debate these questions.

Technical discussions will open with an overview of the background and extent of design and execution codes in Europe, North American and other regions. These discussions will compare and contrast code development processes, content and implementation practices, and explain ongoing code efforts and future needs. Within this overall framework, presentations highlighting execution of the following specific foundation technologies will be offered:

- Piles: Driven and Bored (drilled shafts, continuous flight auger piles [augered cast-in-place piles] and micropiles)
- Deep mixing: dry and wet techniques
- Walls: preformed (sheet piles) and in-situ cast

Presentations selected for the conference will emphasize execution rather than design issues, highlighting field monitoring and quality control, observational methods and lessons learned.

A broad cross section of industry specialists (owners, foundation contractors, engineers, equipment manufacturers and suppliers, authorities and researchers) will participate in panel discussions aimed at discussing and debating the influence of code provisions on sustainable execution of these technologies.

The conference will conclude with the John Mitchell Lecture and a Swedish Heritage Lecture on23 May 2014.

Conference Management
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Tel: 973-423-4030, Fax: 973-423-4031
www.dfi.org, staff@dfi.org

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

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Geoshanghai 2014, International Conference on Geotechnical Engineering, 26 - 28 May 2014, Shanghai, China, www.geoshanghai2014.org

2 – 6 June 2014, Beijing, China
http://wlf3.professional.com

World Landslide Forum 3 aims to provide an information and academic exchange platform for landslides researchers and practitioners. It creates an opportunity to promote worldwide cooperation and to share new theories, technologies and methods in the fields of landslide survey/investigation, monitoring, early warning, prevention and emergency management. The purpose of the Forum is to present the achievements in landslide risk reduction in promoting the sustainable development of society.

General Themes of the Forum

Special sessions

- International programme on landslides (IPL projects and WCoEs)
- Thematic and regional networks on landslides
- Policy, legislation and guidelines on landslides
- Climate & landuse change impacts on landslides
- Recognition and mechanics of Landslide
- Risk controlling on landslides for key facilities and urbanization
- General Landslide Studies
- Building Resilient Landscapes

Sessions for methods of landslide studies

- Physical modeling and material testing
- Application of numerical modeling techniques to landslides
- Remote sensing techniques for landslide mapping and monitoring
- Hazard mapping
- Monitoring, prediction and warning of landslides
- Risk assessment
- Remedial measures & prevention works
- Risk reduction strategy
- Inventory and Database
- Capacity development for landslide mitigation

Session for targeted landslides

- Debris flows
- Rock falls
- Earthquake-induced landslides
- Rain-induced landslides
- Landslides in cultural / natural heritage sites
- Urban landslides
- Landslides in cold regions
- Landslides in coastal and submarine environments
- Natural dams and landslides in reservoirs

Side events

- Student session (undergraduate and master course students are invited to present and discuss their research with their peers to promote cooperation within landslide studying students as well as international presentation practice)
- Landslide practical teaching tools
- Dialogues on country landslide issues
- SATREPS (Science and Technology Research Partnership for Sustainable Development) Project "Development of landslide risk assessment technology in Viet Nam"
- Inter-Graduate school program for sustainable development and survivable societies (GSS), Kyoto university

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For requests about abstract/paper submission, scientific and other academic issues please contact to:
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8th European Conference "Numerical Methods in Geotechnical Engineering" NUMGE14, Delft, The Netherlands, 17-20 juni 2014, www.numge2014.org

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

GeoHubei 2014 International Conference Sustainable Civil Infrastructures: Innovative Technologies and Materials, July 20-22, 2014, Hubei, China http://geohubei2014.geoconf.org

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

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

International Symposium on Geomechanics from Micro to Macro (TC105)
01 - 03 September 2014, Cambridge, United Kingdom
ks207@cam.ac.uk

Organizer: TC105
Contact person: Professor Kenichi Soga

University of Cambridge, Department of Engineering, Trumpington Street, CB2 1PZ, Cambridge,, UK
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JUBILEE CONFERENCE 50th Anniversary of Danube-European Conferences on Geotechnical Engineering Geotechnics of Roads and Railways, 9 - 11 September 2014, Vienna, Austria, www.decge2014.at

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

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

14thIACMAG

September 22 – 25, 2014, Kyoto, Japan
www.14iacmag.org

The 14th International Conference of the International Association for Computer Methods and Advances in Geomechanics (14IACMAG) will be held in Kyoto during September 22-25, 2014. The aim of the conference is to give an up-to-date picture of the broad research field of computational geomechanics. Contributions from experts around the world will cover a wide range of research topics in geomechanics.

IACMAG organizes its conferences about every three years. The first conference in this series was held at Waterways Experiment Station, Vicksburg, Mississippi, USA in 1972, and the subsequent were held in Blacksburg (USA) – 1976, Aachen (Germany) – 1979, Edmonton (Canada) – 1982, Nagoya (Japan) – 1985, Innsbruck (Austria) – 1988, Cairns (Australia) – 1991, Morgantown (USA) – 1994, Wuhan (China) – 1997, Tucson (USA) -2001, Torino (Italy) – 2005, Goa (India) – 2008 and the 13th International Conference on Computer Methods and Advances in Geomechanics was held in Melbourne, Australia in 2011.

The IACMAG conference series have covered computer methods, material modeling and testing, applications to a wide range of geomechanical problems, and recent advances in various areas that may not necessarily involve computer methods. These include: development and usage of new materials; constitutive modeling of materials including deformation, damage and failure; verification of existing and new constitutive models; micro-macro correlation of material response including non-destructive testing; new techniques for material and site characterization; computer aided engineering and expert system; innovative construction using new materials and computer methods; design and rehabilitation of infrastructure; use of system and optimization procedures; and remote sensing.

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E-mail: secretary@14iacmag.org

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

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.

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

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

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

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.

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ΕΝΔΙΑΦΕΡΟΝΤΑ ΓΕΩΤΕΧΝΙΚΑ ΝΕΑ

Analysing the Bingham Canyon mine landslide part 1: the landslide source area

Dave Petley, Wilson Professor of Hazard and Risk, Department of Geography, Durham University, United Kingdom

The Bingham Canyon mine landslide of a few weeks ago is an unusual mass movement. Kennecott Utah have put a set of very high resolution images on their flickr site and have provided permission for me to use them here (with due acknowledgement to them). I thought it would be interesting to take a little time to examine this landslide in more detail. There is a great deal to discuss here, so I am going to break this down into three posts over the next few days.

So lets start by looking at the site from a Google Earth image. This is a vast mine – the excavation is 970 m deep for example:

This image shows the slope that failed before the collapse event. Note the machinery on the haul road for scale:

The landslide source area

This Kenncott Utah image shows the source area very clearly:

There are a couple of really interesting aspects of this. First, the headscarp has an unusual structure – I have annotated this as point 1 in the image below. This layering looks like a sedimentary structure. I wonder if this might be waste material that has been dumped on the slope. If you compare this with the previous image though this looks to be just a small portion of the headscarp, so was probably not a key factor in the failure event.

Second, the base of the landslide (2 in the photograph) is a comparatively planar surface. This would suggest a pre-existing weakness of some sort – maybe a fault? The orientation of this surface would have made the kinematics of failure quite interesting. The landslide could not initially more down dip because of the constraint from the valley wall, such that it would have had to travel slightly along strike, making this a sort of hybrid wedge failure. This structure could provide a hypothesis for the two recorded failure events – the first was a detachment of a lower block, which then released the upper block. This is shown quite nicely from a zoom is on the upper portion of the landslide from the fabulous overview image:

It is clear from this that the trajectory of the landslide was controlled by this basal structure. However, a comparatively small amount of material spilled over the lateral boundary as well.

In the next post I'll take a look at the evidence for the way that the landslide moved, whilst the final one will look at the deposit.

(Americal Geophysical Union Blogosphere, 30 April 2013, http://blogs.agu.org/landslideblog/2013/04/30/analysing-the-bingham-canyon-mine-landslide-part-1-the-landslide-source-area)

Engineering Tackles Sinkholes

Sinkholes have made a surprising amount of news in recent months, and it reminds us of the importance of being able to deal with them from an engineering standpoint. Bill Bracken, Bracken Engineering, Tampa, FL, is a structural engineer who's worked with many organizations. He explains that, thankfully, most sinkholes are much less severe than those making headlines.

"The strategy taken with a sinkhole depends on what it has impacted," he says. "You need to properly diagnose it, develop a remediation plan for the soils, oversee it and diagnose for any structures on top of there," says Bracken. A geologist is the one who performs the subsurface testing to evaluate the soils and answers questions as to whether it's a sinkhole. Then the geotechnical engineer develops remediation of soils. The remediation is usually some form of grout or grouting, whether the cementation or chemical kind. A structural engineer like Bracken will focus on the building.

"The structural aspect depends on many things," he says. "Has the building been displaced, for example. As a structural engineer, I don't focus on what caused or facilitated the building or portion of the building to drop. We come in and say how much it has dropped and what can be done about it. The drop may be an inch or two or sometimes even less than that. Or it can be like a few years back. I saw a three-story apartment building from one end to other had dropped 11 inches. Let's just say it had a true funhouse effect."

Engineers try to determine the nature of sinkholes and prevent further structure deterioration. Image: Brackenengineering.com

Expect the Unexpected

Each solution is different for each structure because they have to look at the loads traveling through it, through the foundation, what type of foundation it is, and how far apart to put the pins. Another factor is what to do about interior slabs, all driven by how impacted the structure is.

Bracken says the mindset often changes for particularly challenging sinkholes. "That's when the geotechnical person comes back and says they can't grout it because the void is too large or organics are so intense that the grout will be ineffective," he adds. "In those cases we stabilize soils. If that doesn't work then it becomes about, 'What do we do for the structure?' In some cases we put in extraordinarily deep pins. In other cases we simply call for the structure to be reinforced. Then it's about the movement and settling over time."

For the aforementioned "funhouse" situation, the length of the building had rotated. "But, using underpins we were able to go in and lift the building back. And, obviously, when you're looking at saving a building, you're also looking at cost of savings versus tear it down and rebuild."

Bracken says this job is definitely not for someone who expects the same thing every day. "Every situation requires its own focus," he says. "I've been at this a long time and I still can see new things."

(Eric Butterman / ASME.org, May 2013, http://www.asme.org/kb/news---articles/articles/construction-and-building/engineering-tackles-sinkholes)

Paper documents failure at Payatas landfill in the Philippines that killed 330

A paper published by Jafari, Prof. Tim Stark and Prof. Scott Merry describes the conditions under which the ~30 m failure took place. The paper is part of Vol. 2 Issue 3 of the International Journal of Geoengineering Case Histories.

Here is the abstract of the paper: "This paper presents an investigation of the slope failure in the Payatas landfill in Quezon City, Philippines. This failure, which killed at least 330 persons, occurred July 10th 2000 after two weeks of heavy rain from two typhoons. Slope stability analyses indicate that the raised leachate level, existence of landfill gas created by natural aerobic and anaerobic degradation, and a significantly over - steepened slope contributed to the slope failure. The Hydrologic Evaluation of Landfill Performance (HELP) model was used to predict the location of the leachate level in the waste at the time of the slope failure for analysis purposes. This paper presents a description of the geological and environmental conditions, identification of the critical failure surface, and slope stability analyses to better understand the failure and present recommendations for other landfills in tropical areas. In addition, this case history is used to evaluate uncertainty in parameters used in back-analysis of a landfill slope failure."

(Geoengineer.org, 10 May 2013, http://www.geoengineer.org/news-center/news/item/525-paper-documents-failure-at-payatas-landfill-in-the-philippines-that-killed-330?utm_source=GeoNewsletter+%23100%2C+May+2013&utm_campaign=Geo+News+28+May+2013&utm_medium=email)

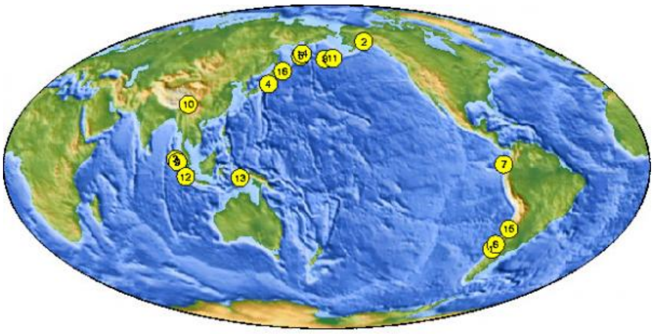
Το Απολιθωμένο Δάσος Λέσβου, ένα από τα σημαντικότερα γεωλογικά μνημεία της χώρας μας συμμετέχει στο διεθνή διαγωνισμό για την ανάδειξη του **8ου Θαύματος στον κόσμο**!

Σας καλούμε να υποστηρίξετε την προσπάθεια προβολής του συμμετέχοντας στην ψηφοφορία από σήμερα 3 Ιουνίου μέχρι τις 30 Σεπτεμβρίου 2013!

Για να ψηφίσουμε πρέπει να μπούμε στο: http://www.virtualtourist.com/8thwonder

ΕΝΔΙΑΦΕΡΟΝΤΑ - ΣΕΙΣΜΟΙ

The 10 Biggest Earthquakes in History



USGS National Earthquake Information Center

The locations of the world's largest-recorded earthquakes. These massive quakes outline the volatile Pacific Ring of Fire

Intro

As massive and deadly as Japan's recent magnitude 9.0 earthquake was, it's not the world's biggest recorded quake.

It is Japan's largest quake, but dating back to 1900, four other earthquakes of magnitude 9.0 or greater have ruptured across the globe, according to data from the U.S. Geological Survey (USGS). We countdown the top 10 biggest recorded earthquakes in the world.

Chile, 1960 - Magnitude 9.5

Wrecked houses in Valdivia, Chile.

Approximately 1,655 people were killed during the largest earthquake ever recorded. Thousands more were injured, and millions were left homeless. Southern Chile suffered $550 million USD in damage.

The quake triggered a tsunami that killed 61 people in Hawaii, 138 in Japan and 32 in the Philippines.

The earthquake ruptured where the Nazca Plate dives underneath the South American Plate, on the Peru-Chile Trench.

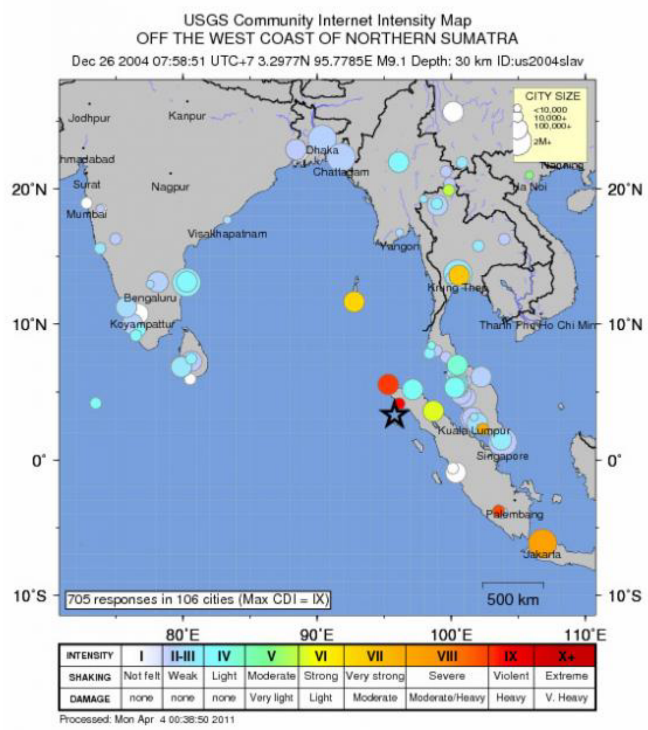
Prince William Sound, Alaska, 1964 - Magnitude 9.2

This great earthquake and ensuing tsunami took 128 lives and caused about $311 million USD in property loss. The earthquake damage was heavy in many towns, including Anchorage, which was about 75 miles (120 kilometers) northwest of the epicenter. The quake ruptured along a seismically active fault between the North American and Pacific plates. The shaking lasted about 3 minutes.

Devastation from the 1965 Prince William Sound earthquake.

Landslides in Anchorage caused heavy damage. Huge slides occurred in the downtown business section and water mains and gas, sewer, telephone and electrical systems were disrupted throughout the area.

Off the West Coast of Northern Sumatra, 2004 - Magnitude 9.1

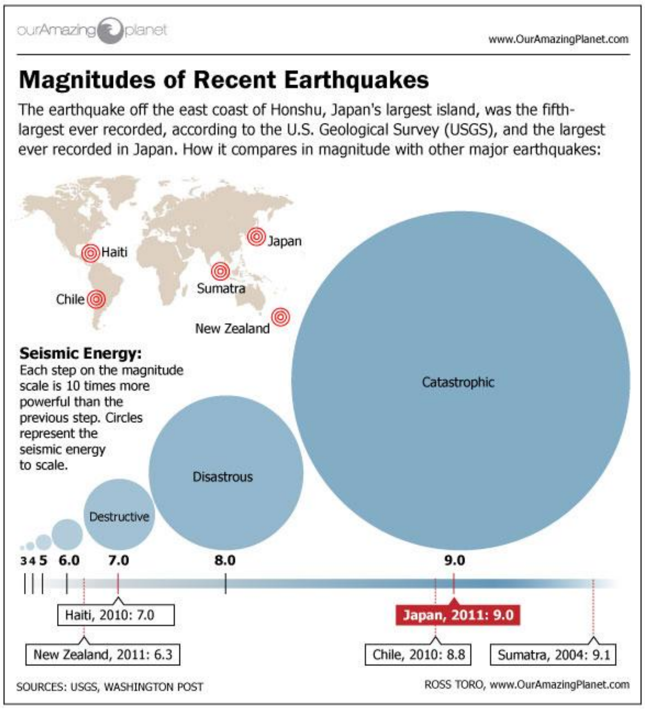


This quake was the third largest earthquake in the world, and the largest since the 1964 earthquake in Prince William Sound, Alaska (see entry #2). In total, 227,898 people were killed or missing and presumed dead and about 1.7 million people were displaced by the earthquake and subsequent tsunami in 14 countries in Southeast Asia and East Africa.

The tsunami caused more casualties than any other in recorded history, although some estimates say the death toll from the 2010 Haiti earthquake was larger. The tsunami was recorded nearly world-wide on tide gauges in the Indian, Pacific and Atlantic Oceans.

This quake struck one day after Christmas along the interface of the India and Burma tectonic plates (huge, moving slabs of the Earth's crust) and was caused by the release of stresses that develop as the India plate dives beneath the Burma plate.

Near the East Coast of Honshu, Japan, 2011 - Magnitude 9.0

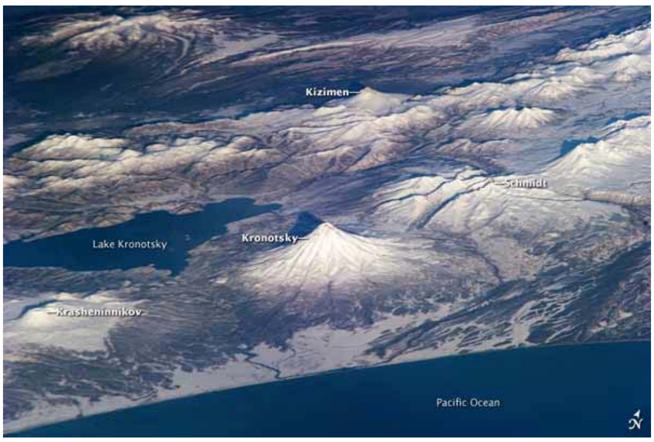


On March 11, a magnitude 9.0 quake triggered a tsunami that killed an estimated 29,000 people and damaged some nuclear reactors. This earthquake is the largest ever recorded in Japan.

Aftershocks continue to rock the island of Honshu. The aftershocks include more than 50 of magnitude 6.0 or greater, and three above magnitude 7.0.

The quake was caused by thrust faulting near the Japan Trench, the boundary between the Pacific and North America tectonic plates. Thrust faulting happens when one tectonic plate dives under another. In this case, the Pacific plate is diving under the North America plate.

Kamchatka Peninsula, Russia, 1952 - Magnitude 9.0



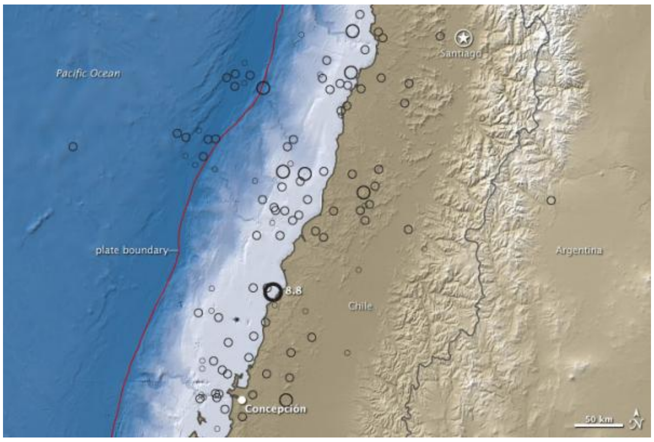
Kamchatka Krai Russia, is home to one of the most active volcanic regions in the world.

The world's first recorded magnitude 9.0 earthquake struck off the east coast of Kamchatka in 1952. The quake generated a 43-foot tsunami (13 m) locally. The tsunami rocked Crescent City, Calif., which was also hit hard by the recent Japan earthquake.

No lives were lost, but in Hawaii, property damage was estimated at up to $1 million USD. The waves tossed boats onto the beach, caused houses to collide, destroyed piers, scoured beaches and moved road pavement.

Kamchatka has a rumbling past and many active volcanoes. It was also hit by an 8.5 magnitude quake in 1923.

Offshore Maule, Chile, 2010 - Magnitude 8.8

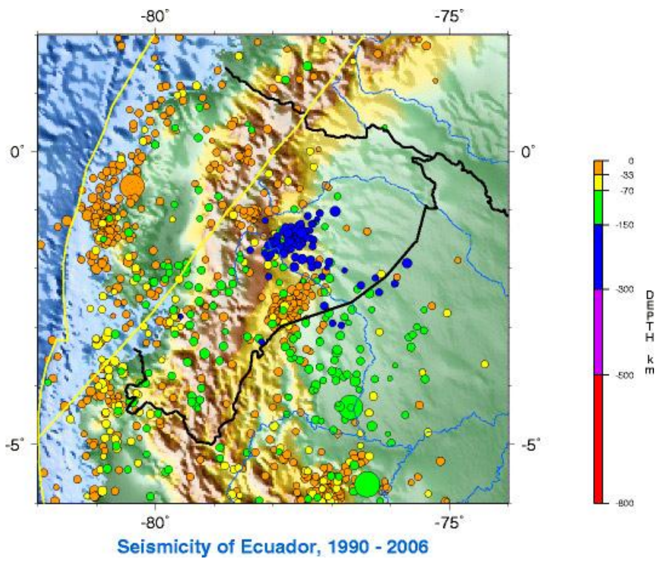


Just last year, at least 500 people were killed and 800,000 were displaced by the earthquake and tsunami that hit central Chile. More than 1.8 million people were affected and the total economic loss was estimated at $30 billion USD. Central Chile is still feeling aftershocks to this day.

The earthquake took place along the boundary between the Nazca and South American tectonic plates.

The quake hit just over a month after the disastrous magnitude 7.0 quake in Port-Au-Prince, Haiti, which killed more than 200,000 people.

Off the Coast of Ecuador, 1906 - Magnitude 8.8

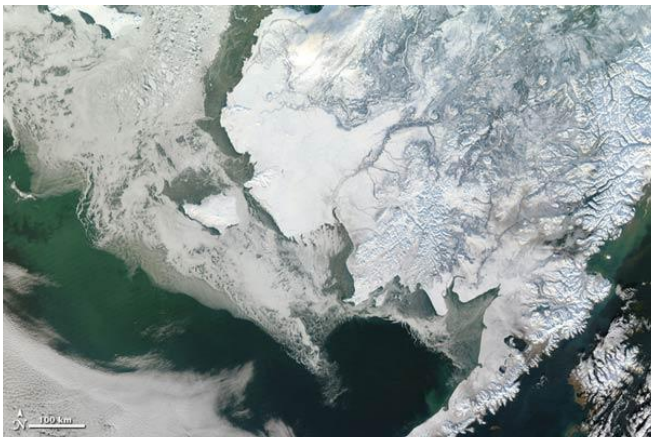


Ecuador is a shakey place, as this map shows. The 1906 quake struck just off-shore.

A catastrophic magnitude 8.8 earthquake ruptured off the coast of Ecuador and Colombia and generated a strong tsunami that killed 500 to 1,500 people. The tsunami spread along the coast of Central America, and even stretched to San Francisco and Japan.

The earthquake occurred along the boundary between the Nazca Plate and the South American Plate. It hit more than 100 years ago, so reports are spotty, but according the USGS, witnesses reported a huge rush of water in Honolulu Bay. All the steam and sailboats in the bay were turned around, and then a sudden flood tide roared inland.

Rat Islands, Alaska, 1965 - Magnitude 8.7



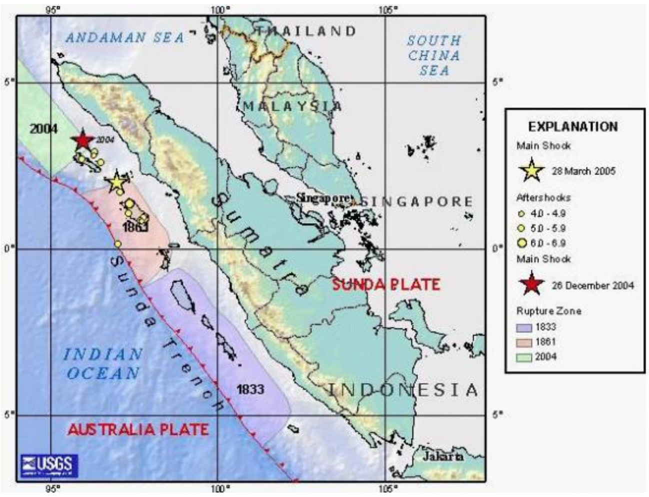
Alaska had been a state for only 7 years when this huge earthquake triggered a tsunami of over 30 feet (10 meters). Despite its size, the quake caused little damage due to its remote location at the tip of the Aleutian Islands.

The tsunami was reported in Hawaii and spread as far away as Japan.

The temblor was the result of the Pacific Plate diving beneath the North American Plate at the Alaska-Aleutian megathrust, which has been the location of many megathrust earthquakes.

The quake cracked wood buildings and split an asphalt runway. Hairline cracks also formed in the runways at the U.S. Coast Guard Loran Station.

Northern Sumatra, Indonesia, 2005 - Magnitude 8.6

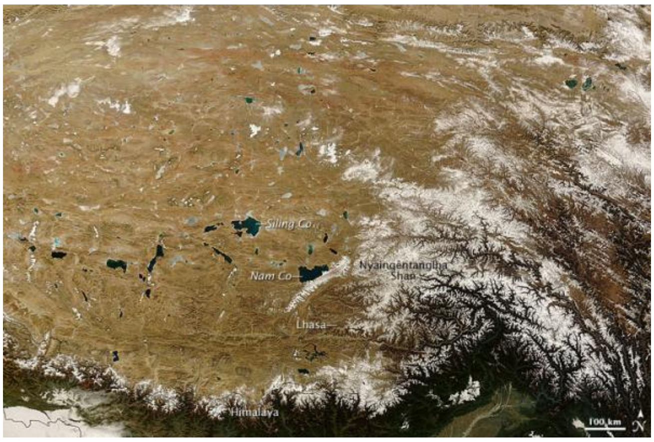


The Sunda Trench unleased a massive quake near Indonesia.

More than 1,000 people were killed, with hundreds more injured, mostly in Nias, in northern Sumatra, Indonesia. The quake hit just months after an even bigger earthquake destroyed the region (see entry #3).

The quake ruptured below the surface of the Indian Ocean, where the Indo-Australian Plate is pushing under the Eurasian plate at the Sunda trench, similar to the 2004 quake.

Assam-Tibet, 1950 - Magnitude 8.6



One of the world's largest recorded quakes struck here, near the Himalayas.

At least 1,500 people were killed across eastern Tibet and Assam, India, when this temblor shook the region. Ground cracks, large landslides and sand volcanoes hit in the area. The quake was felt in the Sichuan and Yunnan Provinces of China, and as far away as Calcutta, India.

The quake caused large landslides that blocked rivers. When the rivers finally burst through the walls of debris, waves inundated several villages and killed hundreds of people.

This quake is commonly called the Assam-Tibet earthquake or the Assam earthquake, even though the epicenter was in Tibet. The quake struck at the intersection of the most vigorous collision of continental plates on the planet, where the Indian continental plate smashes into the Eurasian plate and dives beneath it. The slow-motion crash helped create the massive Himalayas.

(OurAmazingPlanet Staff, Apr 12, 2011, http://www.ouramazingplanet.com/1185-worlds-biggest-earthquakes-110412.html)

How Earthqakes in Chile Have Permanently Deformed Earth

Charles Q. Choi

Earthquakes can permanently crack the Earth, an investigation of quakes that have rocked Chile over the past million years suggests.

Although earthquakes can wreak havoc on the planet's surface, more than a century of research has suggested the Earth actually mostly rebounds after quakes, with blocks of the world's crust elastically springing back, over the course of months to decades, to the way they initially were. Such rebounding was first seen after investigations of the devastating 1906 San Francisco temblor that helped lead to the destruction of more than 80 percent of the city. The rebound is well-documented nowadays by satellite-based GPS systems that monitor Earth's movements.

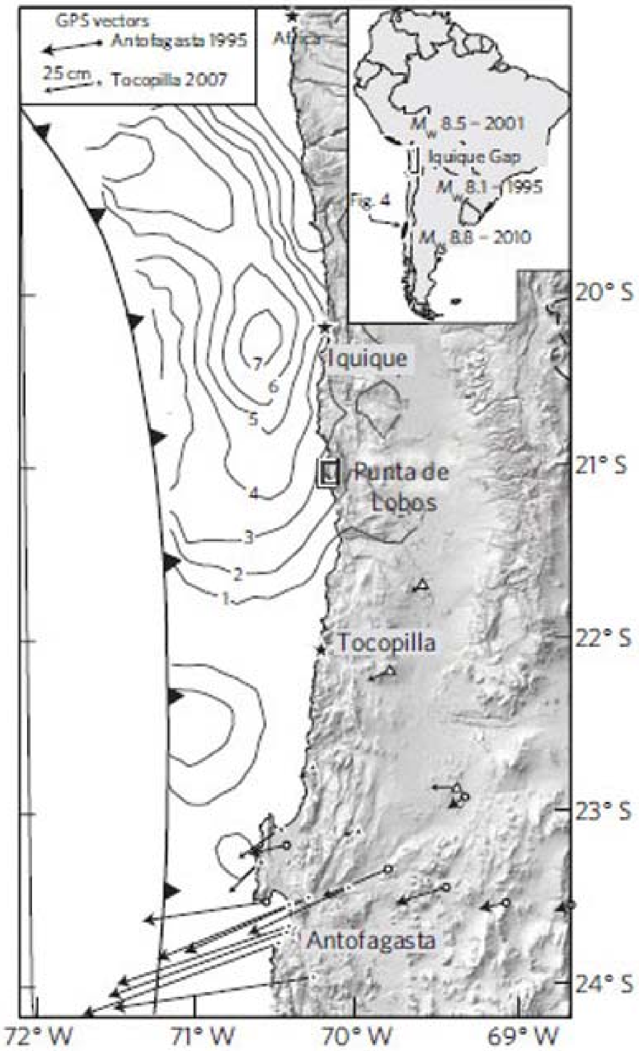
However, structural geologist Richard Allmendinger of Cornell University and his colleagues now find major earthquakes of magnitude 7 or greater apparently caused the crust in northern Chile to crack permanently.

"My graduate students and I originally went to northern Chile to study other features," Allmendinger said. "While we were there, our Chilean colleague, Professor Gabriel González of the Universidad Católica del Norte, took us to a region where these cracks were particularly well-exposed."

"I still remember feeling blown away — never seen anything like them in my 40 years as a geologist — and also perplexed," Allmendinger told OurAmazingPlanet. "What were these features and how did they form? Scientists hate leaving things like this unexplained, so it kept bouncing around in my mind."

Atacama exposed

In northern Chile, "the driest place on Earth, we have a virtually unique record of great earthquakes going back a million years," Allmendinger said. Whereas most analyses of ancient earthquakes only probe cycles of two to four quakes, "our record of upper plate cracking spans thousands of earthquake cycles," he noted.



A map of an the area in Chile where scientists examined signs that millenia of earthquakes had left permanent deformation of the ground

The record of the vast number of earthquakes captured in northern Chilean rocks allowed the researchers to examine their average behavior over a much longer period of time, which makes it easier to pick out any patterns. They discovered that a small but significant 1 to 10 percent of the deformation of the Earth caused by 2,000 to 9,000 major quakes over the past 800,000 to 1 million years was permanent, involving cracks millimeters to meters large in the crust of the Atacama Desert. The crust may behave less elastically than previously thought.

"It is only in a place like the Atacama Desert that these cracks can be observed — in all other places, surface processes erase them within days or weeks of their formation, but in the Atacama, they are preserved for millions of years," Allmendinger said. "We have every reason to believe that our results would be applicable to other areas, but is simply not preserved for study the way that it is in the Atacama Desert," he added.

Model rethink

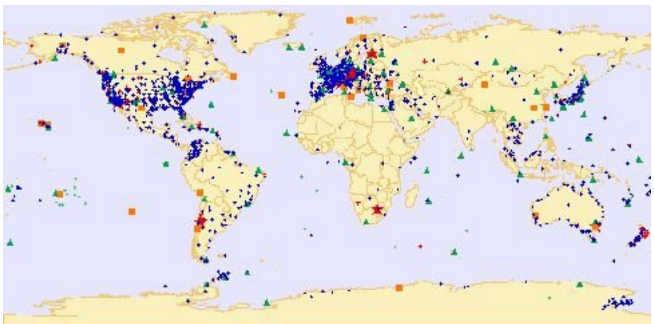
This work "calls into question the details of models that geophysicists who study the earthquake cycle use," Allmendinger said. "Their models generally assume that all of the upper-plate deformation related to the earthquake cycle is elastic — recoverable, like an elastic band — and not permanent. If some of the deformation is permanent, then the models will have to be rethought and more complicated material behaviors used.

The area the researchers studied, the Iquique Gap, "is one of the few places along western South America that has not had a great earthquake in the last 100 years and thus has a high probability of a major earthquake in the next couple of decades," Allmendinger added. "We may get to test out predictions about earthquakes if the next great earthquake there happens in the next couple of decades."

The scientists detailed their findings online April 28 in the journal Nature Geoscience.

(OurAmazingPlanet , Apr 28, 2013, http://www.ouramazingplanet.com/4413-chile-earthquakes-leave-permanent-dent.html)

Τα πάντα κινούνται
Αποκλίσεις στο GPS, παρενέργεια των μεγάλων σεισμών



Το Διεθνές Σύστημα Επίγειου Πλαισίου Αναφοράς είναι ένα σύνολο σημείων με γνωστές συντεταγμένες. Το πρόβλημα είναι ότι τα σημεία αυτά μετακινούνται (Πηγή; ITRFS)

Από την Ευρώπη μέχρι την Αυστραλία, τα περισσότερα από τα σημεία αναφοράς του συστήματος GPS έχουν μετατοπιστεί λόγω των ισχυρών σεισμών της τελευταίας δεκαετίας, με αποτέλεσμα να εμφανίζονται λάθη στις μετρήσεις που βασίζονται στο δορυφορικό σύστημα.

Οι αποκλίσεις αυτές είναι μεν υπερβολικά μικρές για να επηρεάσουν τους οδηγούς, αποτελούν όμως πρόβλημα για τις γεωλογικές μελέτες και τη ρύθμιση της τροχιάς των δορυφόρων.

Η ομάδα του Πολ Τρεγκόνινγκ στο Εθνικό Πανεπιστήμιο της Αυστραλίας βασίστηκε σε υπολογιστικά μοντέλα για να εκτιμήσει τις μετατοπίσεις του γήινου φλοιού που προκάλεσαν οι 15 ισχυρότεροι σεισμοί από το 2000 μέχρι σήμερα.

Όπως αναφέρει η ερευνητική ομάδα στην επιθεώρηση Journal of Geophysical Research: Solid Earth, οι σεισμοί άνω των 8 βαθμών μπορούν να μετατοπίσουν το έδαφος κατά μερικά χιλιοστά ακόμα και σε απόσταση χιλιάδων χιλιομέτρων από το επίκεντρο.

Το αποτέλεσμα είναι ότι όλες οι θέσεις αναφοράς του GPS, με εξαίρεση τη Δυτική Ευρώπη, το ανατολικό άκρο του Καναδά και ορισμένες περιοχές της Αυστραλίας, έχουν μετατοπιστεί κατά αρκετά χιλιοστά από τις αρχικές τους θέσεις.

Τα σημεία αυτά υποτίθεται ότι έχουν συγκεκριμένο στίγμα, καθώς ανήκουν στο λεγόμενο Διεθνές Σύστημα Επίγειου Πλαισίου Αναφοράς, το οποίο χρησιμοποιούν οι επιστήμονες διαφόρων κλάδων για να μετρούν την απόσταση ανάμεσα σε δύο οποιαδήποτε σημεία της Γης.

Για παράδειγμα, ένας γεωλόγος που θέλει να μετρήσει πόσο γρήγορα μετακινείται μια τεκτονική πλάκα θα πρέπει να παρακολουθήσει πώς μεταβάλλεται η απόσταση ανάμεσα σε ένα σημείο αναφοράς που βρίσκεται σε αυτή την πλάκα και ένα δεύτερο σημείο σε άλλη πλάκα.

Ομοίως, ο υπολογισμός της τροχιάς ενός δορυφόρου απαιτεί τις ακριβείς συντεταγμένες των επίγειων σταθμών παρακολούθησης.

Και στις δύο αυτές περιπτώσεις, η μετατόπιση των θέσεων αναφοράς μπορεί να εισάγει λάθη στους υπολογισμούς.

Η αλήθεια είναι ότι το πρόβλημα είναι γνωστό στους επιστήμονες και οι μετατοπίσεις των σημείων αναφοράς συχνά λαμβάνονται υπόψη. Στο Εργαστήριο Αεριώθησης (JPL) της NASA στην Καλιφόρνια, για παράδειγμα, οι μετατοπίσεις υπολογίζονται με τη βοήθεια μαθηματικών μοντέλων που περιγράφουν την κίνηση των λιθοσφαιρικών πλακών.

Η νέα μελέτη δείχνει ωστόσο ότι το πρόβλημα είναι δυνητικά μεγαλύτερο από ό,τι θα φανταζόταν κανείς, και η διεθνής κοινότητα θα πρέπει σύντομα να καταλήξει σε συμφωνία για το πώς μπορεί να βελτιωθεί το Διεθνές Σύστημα Επίγειου Πλαισίου Αναφοράς.

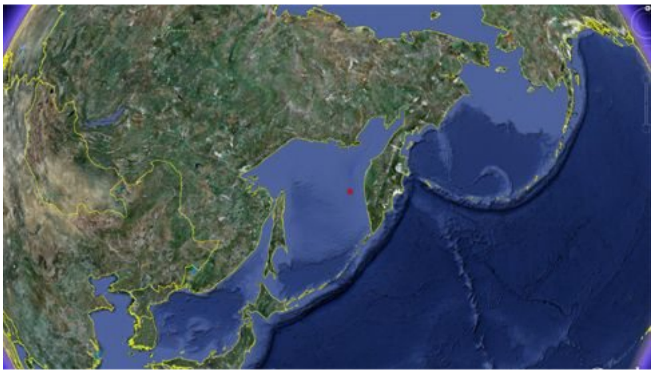
Δεδομένου όμως ότι τα πάντα κινούνται στην επιφάνεια της Γης, η πλήρης εξάλειψη των αποκλίσεων θα ήταν δύσκολη έως αδύνατη.

(Newsroom ΔΟΛ, 26.05.2013, http://news.in.gr/science-technology/article/?aid=1231250227)

Έκπληξη στα έγκατα
Ο σεισμός της Καμτσάτκα «ήταν η ισχυρότερη βαθιά δόνηση»

Ο σεισμός των 8,3 βαθμών που ταρακούνησε την Παρασκευή τη ρωσική Άπω Ανατολή πήγαζε από το ακραίο εστιακό βάθος των 610 χιλιομέτρων και είναι πιθανότατα ο ισχυρότερος που έχει καταγραφεί ποτέ τόσο βαθιά στον γήινο μανδύα.

Οι σεισμολόγοι πίστευαν κάποτε ότι οι σεισμοί δεν ξεσπούν ποτέ σε τόσο μεγάλα βάθη, όπου οι υψηλές θερμοκρασίες κρατούν τα πετρώματα σε ημίρρευστη κατάσταση. Σε απόσταση εκατοντάδων χιλιομέτρων από την επιφάνεια, τα υλικά του μανδύα παραμορφώνονται αργά σαν ζεστό κερί, αντί να σπάνε και να μετατοπίζονται απότομα όπως συμβαίνει στους σεισμούς.



Ο σεισμός σημειώθηκε στη θάλασσα του Οχότσκ, δυτικά της ρωσικής χερσονήσου Καμτσάτκα (Πηγή: Google / USGS)

Ένα από τα συμβάντα που ανέτρεψε αυτή την εικόνα ήρθε το 1994, όταν εκδηλώθηκε στη Βολιβία μια δόνηση των 8,2 βαθμών με εστιακό βάθος 631 χιλιομέτρων.

Όπως αποδείχθηκε, σε ορισμένες περιοχές του κόσμου τα έγκατα της γης συμπεριφέρονται με διαφορετικό τρόπο. Ο σεισμός της Παρασκευής εκδηλώθηκε κάτω από τη θάλασσα του Οχότσκ, δυτικά της χερσονήσου Καμτσάτκα. Σε αυτή την περιοχή, μια από τις πλέον σεισμογόνες σε όλο τον κόσμο, η τεκτονική πλάκα του Ειρηνικού συγκρούεται με την πλάκα της Ευρασίας και βυθίζεται κάτω της. Βυθίζεται μάλιστα τόσο γρήγορα, κατά περίπου 8 εκατοστά το χρόνο, ώστε δεν προλαβαίνει να θερμανθεί και να γίνει ημίρρευστη. Και αυτό σημαίνει ότι μπορεί να δώσει σεισμούς ακόμα και σε βάθος 650 χιλιομέτρων, όπως σημειώνει η αμερικανική γεωλογική υπηρεσία USGS.

Σύμφωνα μάλιστα με το Nature, ο σεισμός στην Καμτσάτκα σπάει το ρεκόρ μεγέθους της Βολιβίας για δόνηση μεγάλου βάθους.

Όπως εξηγεί ανακοίνωση της υπηρεσίας, οι σεισμοί σε αυτά τα ακραία εστιακά βάθη τείνουν να προκαλούν πολύ μικρότερες ζημιές σε σχέση με τους ρηχούς σεισμούς αντίστοιχου μεγέθους.

Συνήθως όμως γίνονται αντιληπτοί σε μεγαλύτερες αποστάσεις - ο σεισμός στη θάλασσα του Οχότσκ ήταν αισθητός ακόμα και στη Μόσχα, σε απόσταση σχεδόν 6.500 χιλιομέτρων.

(Newsroom ΔΟΛ, 26.05.2013, http://news.in.gr/science-technology/article/?aid=1231250210)

M8.3 - Sea of Okhotsk 2013-05-24 05:44:49 UTC

Event Time

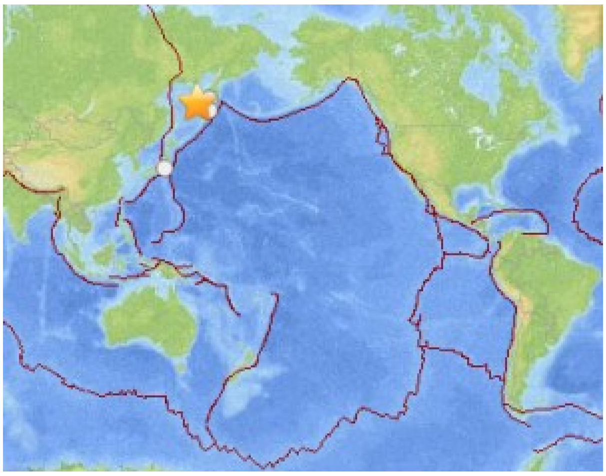
2013-05-24 05:44:49 UTC

Location

54.874°N 153.281°E, depth = 608.9km (378.4mi)

Nearby Cities

1. 362km (225mi) WSW of **Esso, Russia**
2. 383km (238mi) WNW of **Yelizovo, Russia**
3. 400km (249mi) NW of **Vilyuchinsk, Russia**
4. 406km (252mi) WNW of **Petropavlovsk-Kamchatskiy, Russia**
5. 2374km (1475mi) NNE of **Tokyo, Japan**



Tectonic Summary

The May 24, 2013 Mw 8.3 earthquake beneath the Sea of Okhotsk, Russia, occurred as a result of normal faulting at a depth of approximately 600 km. At the latitude of this earthquake, the Pacific and North America plates are converging at a rate of approximately 78 mm/yr in a west-northwest – east-southeast direction, resulting in the subduction of the Pacific plate beneath Eurasia at the Kuril-Kamchatka trench. Note that some authors divide this region into several microplates that together define the re-lative motions between the larger Pacific, North America and Eurasia plates; these include the Okhotsk and Amur microplates that are respectively part of North America and Eurasia. The depth and faulting mechanism of the May 24 earthquake indicate that it ruptured a fault deep within the subducting Pacific lithosphere rather than on the shallow thrust interface between the two plates.

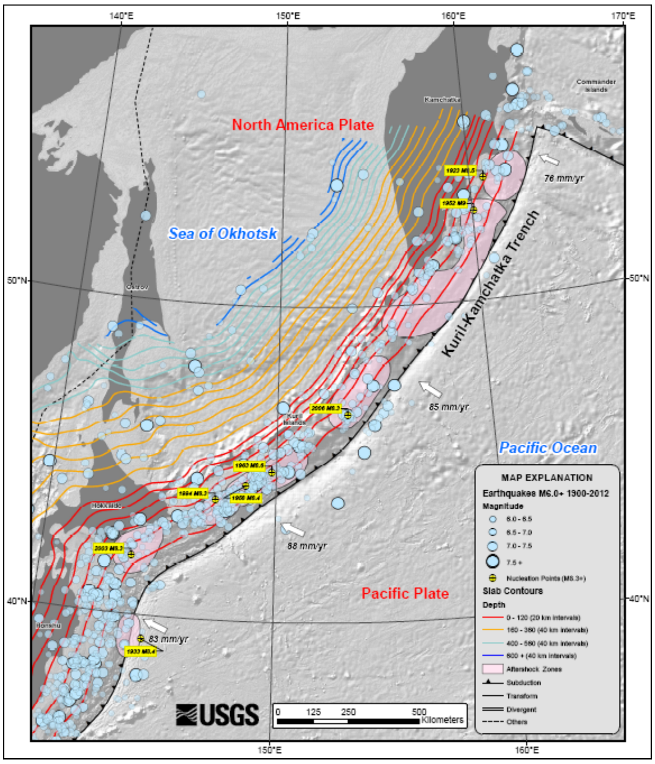
This deep section of the Pacific slab beneath the Sea of Okhotsk has hosted several large earthquakes in the past – four above M 6 within 200 km of the May 24 event since 1988. These included a M 7.7 earthquake in July 2008, 115 km to the southwest at a depth of 630 km, and a M 7.3 event in November of the same year, 95 km to the south-east at a depth of 490 km. Because of their great depths, none are known to have caused damage. Intermediate-depth (70-300 km) and deep-focus (depth > 300 km) earthquakes are distinguished from shallow earthquakes (0-70 km) by the nature of their tectonic setting, and are in general less hazardous than their shallow counterparts, though they may be felt at great distances from their epi-centers. The Pacific slab in the region of the May 24 2013 earthquake is seismically active to depths of over 650 km.

Seismotectonics of the Kuril-Kamchatka Arc

The Kuril-Kamchatka arc extends approximately 2,100 km from Hokkaido, Japan, along the Kuril Islands and the Pacific coast of the Kamchatka Peninsula to its intersection with the Aleutian arc near the Commander Islands, Russia. It marks the region where the Pacific plate subducts into the mantle beneath the Okhotsk microplate, part of the larger North America plate. This subduction is responsible for the generation of the Kuril Islands chain, active volcanoes located along the entire arc, and the deep offshore Kuril-Kamchatka trench. Relative to a fixed North America plate, the Pacific plate is moving towards the northwest at a rate that increases from 75 mm/year near the northern end of the arc to 83 mm/year in the south.

Plate motion is predominantly convergent along the Kuril-Kamchatka arc with obliquity increasing towards the southern section of the arc. The subducting Pacific plate is relatively old, particularly adjacent to Kamchatka where its age is greater than 100 Ma. Consequently, the Wadati-Benioff zone is well defined to depths of approximately 650 km.

The central section of the arc is comprised of an oceanic island arc system, which differs from the continental arc systems of the northern and southern sections. Oblique convergence in the southern Kuril arc results in the partitioning of stresses into both trench-normal thrust earthquakes and trench-parallel strike-slip earthquakes, and the westward translation of the Kuril forearc. This westward migration of the Kuril forearc currently results in collision between the Kuril arc in the north and the Japan arc in the south, resulting in the deformation and uplift of the Hidaka Mountains in central Hokkaido.



The Kuril-Kamchatka arc is considered one of the most seismically active regions in the world. Deformation of the overriding North America plate generates shallow crustal earthquakes, whereas slip at the subduction zone interface between the Pacific and North America plates generates interplate earthquakes that extend from near the base of the trench to depths of 40 to 60 km. At greater depths, Kuril-Kamchatka arc earthquakes occur within the subducting Pacific plate and can reach depths of approximately 650 km.

This region has frequently experienced large (M>7) earthquakes over the past century. Since 1900, seven great earthquakes (M8.3 or larger) have also occurred along the arc, with mechanisms that include interplate thrust faulting, and intraplate faulting. Damaging tsunamis followed several of the large interplate megathrust earthquakes. These events include the February 3, 1923 M8.4 Kamchatka, the November 6, 1958 M8.4 Etorofu, and the September 25, 2003 M8.3 Hokkaido earthquakes. A large M8.5 megathrust earthquake occurred on October 13, 1963 off the coast of Urup, an island along the southern Kuril arc, which generated a large tsunami in the Pacific Ocean and the Sea of Okhotsk, and caused run-up wave heights of up to 4-5 m along the Kuril arc. The largest megathrust earthquake to occur along the entire Kurile-Kamchatka arc in the 20th century was the November 4, 1952 M9.0 event. This earthquake was followed by a devastating tsunami with run-up wave heights as high as 12 m along the coast of Paramushir, a small island immediately south of Kamchatka, causing significant damage to the city of Severo-Kurilsk.

On October 4, 1994, a large (M8.3) intraplate event occurred within the subducted oceanic lithosphere off the coast of Shikotan Island causing intense ground shaking, landslides, and a tsunami with run-up heights of up to 10 m on the island.

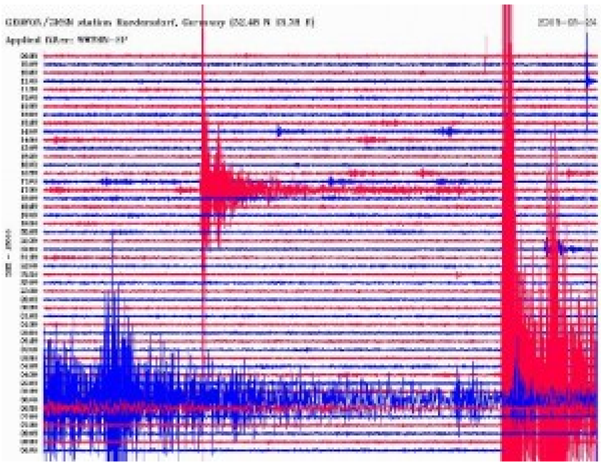
The most recent megathrust earthquake in the region was the November 15, 2006 M8.3 Kuril Island event, located in the central section of the arc. Prior to this rupture, this part of the subduction zone had been recognized as a seismic gap spanning from the northeastern end of the 1963 rupture zone to the southwestern end of the 1952 rupture. Two months after the 2006 event, a great (M8.1) normal faulting earthquake occurred on January 13, 2007 in the adjacent outer rise region of the Pacific plate. It has been suggested that the 2007 event may have been caused by the stresses generated from the 2006 earthquake.

(USGS, http://earthquake.usgs.gov/earthquakes/eventpage/usb000h4jh#summary)

Quake off eastern Russia may be biggest-ever deep temblor

An extraordinarily deep earthquake shook Russia’s Far East this morning. The magnitude-8.3 quake took place nearly 610 kilometres below Earth’s surface, according to preliminary estimates from the US Geological Survey.

Normally rocks at this depth are too hot to rupture quickly in a quake; instead, they deform slowly, like hot wax flowing rather than cold wax shattering. But beneath the Sea of Okhotsk, north of Japan and west of Russia’s Kamchatka Peninsula, the sea floor — a slab of old Pacific crust — is diving beneath Eurasia. The crust is descending fast enough — about 8 centimetres per year — to remain cool enough to rupture even at great depths. The diving plate is thus seismically active down to 650 kilometres or greater.



The seismic signal as recorded in Ruedersdorf, Germany

The epicentre of today’s quake was about 400 kilometres northwest of the city of Petropavlovsk-Kamchatsky. Deep quakes cause less damage than shallow ones, and early news reports suggest that injury and damage were minimal, although the shaking was felt as far away as Moscow.

A series of smaller quakes, up to about magnitude 6.0, had shaken just south and east of Petropavlosk-Kamchatsky over the past several days. But they were far shallower. Figuring out how the shallow earthquake swarm and the large deep quake are related — if they are — is likely to be a topic of intense study.

The Okhotsk quake rivals and perhaps surpasses the magnitude-8.2 quake that hit northern Bolivia on 9 June 1994. That one occurred 631 kilometres deep, reshaping geologists’ ideas about how earthquakes could occur so far down.

(Alexandra Witze / NATURA, 24 May 2013, http://blogs.nature.com/news/2013/05/quake-off-eastern-russia-may-be-deepest-ever.html)

ΕΝΔΙΑΦΕΡΟΝΤΑ - ΛΟΙΠΑ

Ταινία από το Ιστορικό Αρχείο της ΕΡΤ για την Καταστροφή της Σιδηροδρομικής Γέφυρας του Ισθμού της Κορίνθου και για την Καταστροφή και τις Προεργασίες Ανακατασκευής της Οδικής Γέφυρας

Η ταινία αρχίζει με σκηνές κινηματογραφημένες από το Γερμανικό Στρατό Κατοχής. Λίγο πριν από την αποχώρησή τους από την Ελλάδα οι γερμανικές δυνάμεις καταστρέφουν τις υποδομές του συγκοινωνιακού δικτύου στον Ισθμό της Κορίνθου (1-10/10/1944). Πυροδοτώντας τα εκρηκτικά οι Γερμανοί ανατινάζουν τη σιδηροδρομική γέφυρα και ρίχνουν βαγόνια τρένου στη διώρυγα για να τη φράξουν. Στη συνέχεια, ανατινάζουν με μεγάλη έκρηξη την οδική γέφυρα που είχε κατασκευαστεί από τους Ιταλούς και ολοκληρώνουν την καταστροφή πυροδοτώντας εκρήξεις στο βυθό του προλιμένα. Τον Απρίλιο του 1947 η Σχολή Μηχανικού του Ελληνικού Στρατού αναλαμβάνει την ανακατασκευή της οδικής γέφυρας με υλικό τύπου Μπέιλεϋ, που αποτελεί δωρεά της ΟΥΝΡΑ. Η προετοιμασία για την εγκατάσταση της γέφυρας αρχίζει με την επιλογή και τη χάραξη της θέσης της και συνεχίζεται με την εκσκαφή του χώρου για την τοποθέτηση των κυλίστρων καθέλκυσης, ενώ παράλληλα κατασκευάζονται από μπετόν τα βάθρα όπου θα στηριχθεί η γέφυρα στις δύο όχθες. Όλα είναι έτοιμα για να αρχίσει η κυρίως κατασκευή της γέφυρας.

(Το υλικό αυτό τεκμηριώθηκε από το Εθνικό Οπτικοακουστικό Αρχείο)

(ΕΡΤ / Ιστορικό Αρχείο / Γεγονότα Δεκαετίας 1940, Χρονολογία Παραγωγής / Πρώτης Εκπομπής : Κυριακή, 1 Οκτωβρίου 1944 / Τρίτη, 15 Απριλίου 1947, http://www.ert-archives.gr/V3/public/main/page-assetview.aspx?tid=0000032058)

Brazilian 'Atlantis': Submersible Finds Possible Evidence Of Continent Deep Beneath Atlantic Ocean (VIDEO)

Nearly 2,600 years after Greek philosopher Plato wrote about the fabled metropolis of Atlantis, vanished forever beneath the sea, a Japanese-manned submersible has discovered rock structures that may be evidence of a continent that similarly disappeared beneath the Atlantic Ocean many, many years ago.

The Japan Agency for Marine-Earth Science and Technology (JAMSTEC) and the Geology Service of Brazil (CPRM) announced Tuesday the discovery of granite at the bottom of the Atlantic Ocean, about 900 miles off the coast of Rio de Janeiro.

Granite, normally found on dry land, suggests that a continent once existed in the region and then sank, much in the same way Plato described, according to The Japan Times.

“South America and Africa used to be a huge, unified continent," Shinichi Kawakami, a professor at Gifu University told the outlet. "The area in question may have been left in water as the continent was separated in line with the movements of plates."

Plato wrote that Atlantis was "an island situated in front of the straits which are by you called the Pillars of Hercules," Reuters notes. During Plato's time, the Straits of Gibraltar were known as the Pillars of Hercules, so Atlantis-seekers have focused their search in the Mediterranean and Atlantic. (However, others disregard the tale altogether, NTDTV points out.)

CPRM geology director Roberto Ventura Santos emphasizes that his team's references to the so-called "Brazil’s Atlantis" are mostly symbolic.

"Obviously, we don’t expect to find a lost city in the middle of the Atlantic," Santos said, according to the Telegraph. “But if it is the case that we find a continent in the middle of the ocean, it will be a very big discovery that could have various implications in relation to the extension of the continental shelf.”

JAMSTEC, which is currently conducting a variety of missions and experiments, has been exploring this region in the Atlantic for some time using its state-of-the-art manned mini-sub the Shinkai 6500, the Telegraph notes.

On its website, JAMSTEC states its mission is "to contribute to the advancement of academic research in addition to the improvement of marine science and technology by proceeding the fundamental research and development on marine, and the cooperative activities on the academic research related to the Ocean for the benefit of the peace and human welfare."

Finding Plato's actual lost city has been something of a holy grail for many researchers and has spawned several unproven "breakthroughs."

In 2011, a team of researchers claimed to have found Atlantis buried in mud off the tip of Spain. The ancient city was allegedly flooded by a devastating tsunami, according to PopSci. In 2009, a mysterious, underwater grid pattern on Google Earth was also heralded by some as the lost city; however, Google Earth quickly explained it was a glitch created by sonar boat data collection, Time reported.

(Meredith Bennett-Smith / The Huffington Post, 7 May 2013 http://www.huffingtonpost.com/2013/05/07/brazilian-atlantis-japanese-submersible-atlantic-ocean_n_3231437.html)

A member of the Geological Service of Brazil with the rock dug out from the deep sea bed 1,500 km off the coast of Rio de Janeiro

Record breaking demolition of viaduct in China

A two-mile viaduct in the Chinese city of Wuhan has been demolished, breaking a record for the longest reinforced concrete bridge ever blown up in the country.

The viaduct, built in 1997, is to be replaced by a six-lane viaduct, more than three miles long. Watch the video:

http://www.bbc.co.uk/news/world-asia-22586997

(Maxine Mawhinney / BBC News Asia, 19 May 2013)

Επιστήμονες - «αλχημιστές» μετέτρεψαν το τσιμέντο σε μέταλλο

Η «μαγεία» έγινε πραγματικότητα, από ερευνητές του Εθνικού Εργαστηρίου Argonne

Οι μεσαιωνικοί αλχημιστές θα ζήλευαν τους σύγχρονους επιστήμονες, οι οποίοι κατάφεραν να μετατρέψουν το υγρό τσιμέντο σε υγρό μέταλλο. Με τον τρόπο αυτό, το τσιμέντο έγινε ημιαγωγός του ηλεκτρικού ρεύματος και ανοίγει πλέον ο δρόμος, μεταξύ άλλων, για να χρησιμοποιηθεί στην κατασκευή ηλεκτρονικών συσκευών και «τσιπ» υπολογιστών.

Η «μαγεία» έγινε πραγματικότητα από ερευνητές του Εθνικού Εργαστηρίου Argonne του υπουργείου Ενέργειας των ΗΠΑ, σε συνεργασία με συναδέλφους τους από την Ιαπωνία, τη Γερμανία και τη Φινλανδία. Η σχετική δημοσίευση, με επικεφαλής τον Αμερικανό φυσικό Κρις Μπένμπορ, έγινε στο περιοδικό της Εθνικής Ακαδημίας Επιστημών των ΗΠΑ (PNAS).

Όπως ανέφερε ο Μπένμορ, το νέο υλικό έχει πολλές δυνητικές εφαρμογές όπως σε ηλεκτρικές αντιστάσεις με μορφή λεπτού φιλμ, οι οποίες χρησιμοποιούνται σε επίπεδες οθόνες υγρών κρυστάλλων.

Το νέο υλικό αποτελεί ένα είδος μεταλλικού γυαλιού, που έχει καλύτερη αντίσταση στη διάβρωση σε σχέση με ένα συμβατικό μέταλλο, είναι λιγότερο εύθραυστο από το γυαλί, μεταδίδει το ηλεκτρικό ρεύμα, εμφανίζει μεγαλύτερες ενεργειακές (μαγνητικές) απώλειες και διαθέτει καλύτερη ρευστότητα, πράγμα που βοηθάει στην επεξεργασία του.

Έως τώρα, μόνο μέταλλα είχε καταστεί εφικτό να μετατραπούν σε αυτή την μεταβατική φάση του μεταλλικού γυαλιού. Η μετατροπή του τσιμέντου σε υγρό αγώγιμο μέταλλο γίνεται με τη διαδικασία της «παγίδευσης ηλεκτρονίων», η οποία στο μέλλον πιθανώς θα επιτρέψει και σε άλλα στερεά μονωτικά υλικά να μετατραπούν σε ημιαγωγούς του ρεύματος. Οι σχετικοί πειραματισμοί θα ξεκινήσουν σύντομα.

(Η ΚΑΘΗΜΕΡΙΝΗ, 28 Μαΐου 2013, Πηγή: ΑΠΕ-ΜΠΕ, http://portal.kathimerini.gr/4dcgi/_w_articles_kathciv_1_28/05/2013_501077)

Στην 5η θέση μεταξύ 60 χωρών η Ελλάδα στην κατάταξη της Παγκόσμιας Επετηρίδας Ανταγωνιστικότητας για την ύπαρξη πολύ καλά εκπαιδευμένων και αποτελεσματικών μηχανικών

Κατά τέσσερις θέσεις σε σχέση με το 2012 ανέβηκε η Ελλάδα στην κατάταξη της Παγκόσμιας Επετηρίδας Ανταγωνιστικότητας (http://www.imd.org/uupload/imd.website/wcc/scoreboard.pdf) που εξέδωσε το International Insitute for Management Development (IMD), εξέλιξη η οποία αποδίδεται κατά κύριο λόγο στις μεταρρυθμίσεις σε ό,τι αφορά τη λειτουργία των επιχειρήσεων, τις εξαγωγές, καθώς και τη βελτίωση της εικόνας της χώρας στο εξωτερικό.

Η Ελλάδα, παρά τη βελτίωση της θέσης της, εξακολουθεί να συμπεριλαμβάνεται μεταξύ των ουραγών στη σχετική κατάταξη, αφού το 2013 βρίσκεται στην 54η θέση μεταξύ 60 χωρών, έναντι της 58ης θέσης ένα χρόνο πριν. Κι αυτό, διότι παρά τις αλλαγές στην αγορά εργασίας και τις προσπάθειες για περιορισμό της γραφειοκρατίας, η χώρα μας βρίσκεται στην τελευταία θέση του κατά κεφαλήν ΑΕΠ, στην προτελευταία σε ό,τι αφορά την προσέλκυση ξένων άμεσων επενδύσεων και δύο θέσεις από το τέλος με κριτήριο το ποσοστό ανεργίας των νέων.

Επί της ουσίας η αιτία για την αργή ανάκτηση της ανταγωνιτικότητας στην Ελλάδα, αλλά και για τις μεγάλες απώλειες που συνολικά υφίσταται η Ευρωζώνη στον τομέα αυτό είναι σύμφωνα με το IMD η εφαρμογή σκληρών μέτρων λιτότητας. «Η στασιμότητα της Ευρωζώνης και η δυναμική επιστροφή των ΗΠΑ στην κορυφή της παγκόσμιας κατάταξης ανταγωνιστικότητας, καθώς και τα καλά νέα από την Ιαπωνία, έχουν οδηγήσει στην αναβίωση της συζήτησης σχετικά με τη λιτότητα. Οι διαρθρωτικές μεταρρυθμίσεις είναι αναπόφευκτες, όμως η ανάπτυξη παραμένει προϋπόθεση για την ανταγωνιστικότητα. Επιπλέον, η σκληρότητα των μετρων λιτότητας πολύ συχνά ανταγωνίζεται τον λαό. Σε τελική ανάλυση, οι χώρες χρειάζεται να διατηρούν την κοινωνική συνοχή για να διανέμουν την ευημερία», επεσήμανε χαρακτηριστικά χθες ο διευθυντής του Κέντρου Παγκόσμιας Ανταγωνιστικότητας του IMD κ. Στεφάν Γκαρέλι και πρόσθεσε: «Οι χρυσοί κανόνες για την ανταγωνιστικότητα είναι απλοί: να παράγεις, να διαφοροποιείσαι, να εξάγεις, να επενδύεις στις υποδομές, να υποστηρίζεις τις μικρομεσαίες επιχειρήσεις, να εφαρμόζεις δημοσιονομική πειθαρχία και πάνω απ' όλα να διατηρείς την κοινωνική συνοχή». Στις επιμέρους κατηγορίες δεικτών, βάσει των οποίων προκύπτει η γενική κατάταξη, η Ελλάδα, σύμφωνα με τον Σύνδεσμο Βιομηχανιών Βορείου Ελλάδος (σ.σ. αποτελεί το συνεργάτη του IMD στην Ελλάδα για τη μελέτη ανταγωνιστικότητας), σημείωσε το 2013 τις ακόλουθες επιδόσεις:

- Στον τομέα της «Οικονομικής Αποδοτικότητας» υποχώρησε στην 59η θέση από την 58η το 2012. Πρόκειται, μάλιστα, για τη χειρότερη θέση που κατείχε ποτέ η χώρα στον δείκτη αυτό από το 1999.

- Στον τομέα της «Κυβερνητικής Αποτελεσματικότητας» ανέβηκε στην 56η θέση από την 58η το 2012.

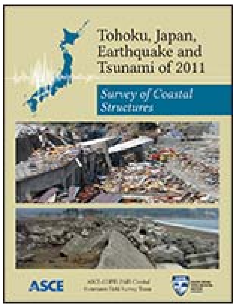
- Στον τομέα της «Επιχειρηματικής Αποτελεσματικότητας» η θέση της βελτιώθηκε κατά εννέα θέσεις, στην 47η θέση από την 56η το 2012.

- Στον τομέα των «Υποδομών» υποχώρησε κατά μία θέση, καταλαμβάνοντας για το 2013 την 35η θέση από την 34η θέση που κατείχε το 2012.

Δυνατά «χαρτιά» για την ελληνική οικονομία είναι το εξειδικευμένο και έμπειρο εργατικό δυναμικό (η Ελλάδα κατατάσσεται στην 6η θέση με βάση αυτό το κριτήριο), ο τουρισμός (στη 10η θέση), οι εξαγωγές (στην 19η θέση) και **η ύπαρξη πολύ καλά εκπαιδευμένων και αποτελεσματικών μηχανικών (στην 5η θέση)**. Σε ό,τι αφορά την παγκόσμια κατάταξη, στην 1η θέση πέρασαν οι ΗΠΑ, αφήνοντας το Χονγκ Κονγκ στην 3η θέση, από πρώτο πέρυσι, ενώ στη δεύτερη θέση βρίσκεται η Ελβετία. Το μοναδικό κράτος της Ευρωζώνης που συμπεριλαμβάνεται στην πρώτη δεκάδα είναι η Γερμανία, ενώ χαμηλά στην κατάταξη, υποχωρώντας αρκετές θέσεις σε σχέση με το 2012, βρίσκονται η Ιταλία, η Ισπανία και η Πορτογαλία. Τέλος, από τις λεγόμενες BRICS, μόνο η Κίνα και η Ρωσία αύξησαν την ανταγωνιστικότητά τους, με το IMD να επισημαίνει ότι οι αναδυόμενες οικονομίες εξαρτώνται σε μεγάλο βαθμό από την παγκόσμια οικονομική ανάκαμψη, η οποία όμως φαίνεται να καθυστερεί.

(Δήμητρα Μανιφάβα / Η ΚΑΘΗΜΕΡΙΝΗ – ΙΕΚΕΜ ΤΕΕ, 31 Μαΐου 2013)

ΝΕΕΣ ΕΚΔΟΣΕΙΣ ΣΤΙΣ ΓΕΩΤΕΧΝΙΚΕΣ ΕΠΙΣΤΗΜΕΣ



Tohoku, Japan, Earthquake and Tsunami of 2011
Survey of Coastal Structures

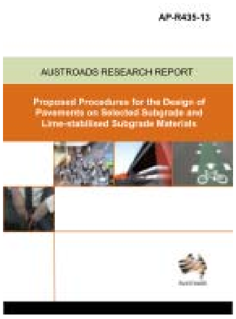
ASCE-COPRI-PARI Coastal Structures Field Survey Team; Edited by Lesley Ewing, Shigeo Takahashi and Catherine M. Petroff

On March 11, 2011, a magnitude 9.0 earthquake rumbled off the east coast of Japan, followed by a tsunami that generated waves more than 18 meters high. The earthquake and tsunami caused devastation throughout the Tohoku and Sendai regions of Japan, killing nearly 16,000 people and causing damage estimated at more than US$126 billion.

For seven days in May 2011, an ASCE/COPRI Coastal Structures Team investigated the earthquake and tsunami effects specific to engineered coastal structures, coastal landforms, and coastal processes in northeast Japan. Joined by colleagues from Japan's Port and Airport Research Institute, the survey team observed five categories of coastal protection structures: coastal dikes, tsunami seawalls, floodwater gates, breakwaters, and vegetated greenbelts. This report provides background to the field investigation, including an event summary, the tectonic and geologic setting, and the generation, propagation, and runup of the tsunami. It then describes 11 mechanisms causing damage or failure and includes photographs illustrating the effects each mechanism. Finally, the report presents lessons learned regarding what worked and what didn't and how this knowledge can be used to engineer against future natural disasters.

For coastal engineers, structural engineers, geotechnical engineers, and disaster risk managers, the observations and analysis in this report provide critical information for engineering infrastructure that withstands major earthquake and tsunami events.

(ASCE, 2013)



Proposed Procedures for the Design of Pavements on Selected Subgrade and Lime Stabilised Subgrade Materials

The report reviews current Australian and selected international structural design methods for pavements on lime-stabilised subgrade layers. Research to investigate in-service strength and modulus of lime-stabilised materials is also summarised. The report proposes design methods for inclusion in the Austroads *Guide to Pavement Technology Part 2: Pavement Structural Design.* It is anticipated that these draft procedures will be used by practitioners and revised as necessary for inclusion in the next edition of the Guide.

(Austroads Publications Online, Publication no: AP-R435-13 Pages: 49, https://www.onlinepublications.austroads.com.au/items/AP-R435-13)

The Essential Guide to Eurocodes Transition

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ΗΛΕΚΤΡΟΝΙΚΑ ΠΕΡΙΟΔΙΚΑ

INTERNATIONAL TUNNELLING AND UNDERGROUND SPACE ASSOCIATION
ita@news n°49
www.ita-aites.org/media/archives/ITA@News/ITA-AITES_Newsletter_49.pdf

Κυκλοφόρησε το Τεύχος No. 49 – Μάιος 2013 των ita@news της International Tunnelling Association με τα παρακάτω περιεχόμενα:

- Message from In Mo LEE, ITA President
- WTC 2013
- DemInar on Sprayed waterproofing membrane
- ITA and Outer Space
- UN Habitat
- ITA Reports
- ATC 2013 First Arabian Tunnelling Conference 2013 - 10th - 11th December 2013 Dubai (United Arab Emirates)
- IRF World Meeting & Exhibition - 9th - 13th November 2013 Riyadh (Saudi Arabia)

www.geoengineer.org

Κυκλοφόρησε το εορταστικό Τεύχος #100 του **Newsletter του Geoengineer.org** (Μάιος 2013) 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).

ΕΚΤΕΛΕΣΤΙΚΗ ΕΠΙΤΡΟΠΗ ΕΕΕΕΓΜ (2012 – 2015)

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