Boulders – South Island – New Zealand

Αρ. 40 – ΟΚΤΩΒΡΙΟΣ 2011

ΕΛΛΗΝΙΚΗ ΕΠΙΣΤΗΜΟΝΙΚΗ ΕΤΑΙΡΕΙΑ ΕΔΑΦΟΜΗΧΑΝΙΚΗΣ & ΓΕΩΤΕΧΝΙΚΗΣ ΜΗΧΑΝΙΚΗΣ

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ΙΝΣΤΙΤΟΥΤΟ ΓΕΩΛΟΓΙΚΩΝ & ΜΕΤΑΛΛΕΥΤΙΚΩΝ ΕΡΕΥΝΩΝ

Το **Ι.Γ.Μ.Ε.**, με τη σημερινή του μορφή, ιδρύθηκε το 1976 και βασικός σκοπός του είναι η έρευνα και η μελέτη της γεωλογικής δομής της χώρας, ο εντοπισμός και η αξιολόγηση των ορυκτών και ενεργειακών πρώτων υλών (πλην υδρογονανθράκων), η έρευνα και αξιοποίηση του υπόγειου υδατικού δυναμικού, η επικινδυνότητα από τις φυσικές καταστροφές κ.ά. με στόχο πάντα τη βελτίωση της ποιότητας ζωής και την προστασία του περιβάλλοντος. Είναι Ν.Π.Ι.Δ., εποπτεύεται από το Υπουργείο Περιβάλλοντος, Ενέργειας & Κλιματικής Αλλαγής και αποτελεί τον επίσημο Σύμβουλο της Πολιτείας σε θέματα γεωεπιστημών, ορυκτών και ενεργειακών πρώτων υλών

Το ΙΓΜΕ άρχισε τη δραστηριότητά του ως ΙΓΕΥ το 1952, συνέχισε ως ΕΘΙΓΜΕ (1972-1976) και στη συνέχεια ως ΙΓΜΕ (1976 μέχρι σήμερα). Στην πολυετή πορεία του στον Τομέα των Γεωεπιστημών εστίασε τη δραστηριότητά του στη συμβολή για την οικονομική ανάπτυξη της χώρας και τη βελτίωση της ποιότητας ζωής μέσα από την αξιοποίηση των ορυκτών και ενεργειακών πρώτων υλών, των υδατικών πόρων και γενικότερα των φυσικών πόρων, με φροντίδα για το περιβάλλον.

Στα σχεδόν 60 χρόνια της ιστορικής του διαδρομής, το Ινστιτούτο προσέφερε τα μέγιστα στην ανασυγκρότηση και εν

(συνέχεια στη σελίδα 2)

C O N T E N T S

(συνέχεια από την πρώτη σελίδα)

συνεχεία στην ανάπτυξη της Εθνικής Οικονομίας, στην ευημερία του ελληνικού λαού και, βεβαίως, στις γεωεπιστήμες στην Ελλάδα. Και όμως τον οργανισμό αυτό, στα πλαίσια των ανεκδιήγητων «οριζόντιων» περικοπών, το κράτος **τον κλείνει**!

Όλοι μας έχουμε χρησιμοποιήσει τους γεωλογικούς χάρτες της Ελλάδας που συντάχθηκαν από το ΙΓΜΕ. Όλοι μας έχουμε χρησιμοποιήσει την βιβλιοθήκη του ΙΓΜΕ, η οποία κρύβει πραγματικούς θησαυρούς για τους ερευνητές αλλά και τους μηχανικούς της πράξης.

Το ΙΓΜΕ, μεταξύ άλλων, εκτελεί χρέη Εθνικής Γεωλογικής Υπηρεσίας, σκοπός της οποίας είναι η αποτύπωση – καταγραφή και τελικά η γνώση της βασικής γεωλογικής δομής της χώρας, με χαρτογραφήσεις, γεωχημεία, γεωφυσική, τηλεπισκόπηση, βάσεις γεωεπιστημονικών δεδομένων κ.ά. Δεν υπάρχει ανεπτυγμένη χώρα στον κόσμο χωρίς Εθνική Γεωλογική Υπηρεσία. Και μάλιστα, στις περισσότερες χώρες, στην γεωλογική υπηρεσία είναι ενταγμένα και τα αντίστοιχα γεωδυναμικά ινστιτούτα (π.χ. USGS, BGS κ.λπ.).

Τα τελευταία χρόνια πολλοί από εμάς, ιδιαίτερα οι μελετητές γεωτεχνικοί μηχανικοί, βρεθήκαμε σε αρκετές περιπτώσεις αντιμέτωποι με το ΙΓΜΕ. Και αυτό γιατί οι περικοπές στην κρατική χρηματοδότησή του ώθησαν τις διοικήσεις του να ασχοληθούν με αλλότρια θέματα και σε πολλές περιπτώσεις να υποκαταστήσουν τους μελετητές, είτε μηχανικούς, είτε γεωλόγους. Τούτο, όμως, δεν σημαίνει ότι πρέπει να κλείσει το ΙΓΜΕ. Το ΙΓΜΕ πρέπει να συνεχίση να υφίσταται, επανερχόμενο στις δραστηριότητες που τόσο προσέφεραν στην ελληνική επιστημονική κοινότητα και εμείς να ενώσουμε την φωνή μας με αυτήν των άλλων αντιδρώντων στην κατάργησή του.

Λόγω καθυστέρησης στο κλείσιμο των θεμάτων του XV Πανευρωπαϊκού Συνεδρίου Εδαφομηχανικής και Γεωτεχνικής Μηχανικής με το γραφείο που βοήθησε στην διοργάνωσή του, ο απολογισμός του θα δημοσιευθή στο επόμενο τεύχος ΤΩΝ ΝΕΩΝ ΤΗΣ ΕΕΕΕΓΜ.

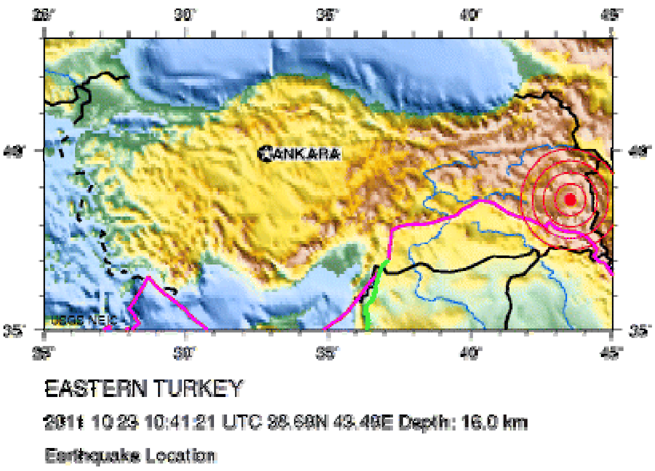
Συνάδελφοι ζήτησαν να αποστέλλωνται τα δημοσιευμένα στο περιοδικό άρθρα και σε ξεχωριστά ηλεκτρονικά αρχεία, ώστε να είναι ευχερής η αποθήκευσή τους. Θα φροντίσουμε στην υπό κατασκευή ιστοσελίδα της ΕΕΕΕΓΜ να υπάρχη ειδικός χώρος με τα αρχεία όλων των άρθρων (και των ήδη δημοσιευμένων).

ΕΠΙΚΑΙΡΟΤΗΤΑ

Ο Σεισμός της 23ης Οκτωβρίου στην Τουρκία

Earthquake Details

Magnitude	**7.1**
Date-Time	Sunday, October 23, 2011 at 10:41:21 UTC
Location	38.691°N, 43.497°E
Depth	16 km (9.9 miles) set by location program
Region	EASTERN TURKEY
Distances	16 km (9 miles) NNE of Van 118 km (73 miles) N of Hakkari 127 km (78 miles) SSE of Agri (Karakose) 929 km (577 miles) E of ANKARA



Tectonic Summary

Turkey is a tectonically active country that experiences frequent destructive earthquakes. On a broad scale, the seismotectonics of the region near the October 23, 2011 earthquake are controlled by the collision of the Arabian Plate and Eurasian plates; at the latitude of this event, the Arabian plate converges with Eurasia in a northerly direction at a rate of approximately 24 mm/yr. West of the October 23, 2011, earthquake tectonics are dominated by strike-slip faulting on the East (in southern Turkey) and North (in northern Turkey) Anatolian fault zones. These large, translational fault systems extend across much of central and western Turkey and accommodate the western motion of the Anatolian block as it is being squeezed by the converging Arabian and Eurasian plates. In the area of Lake Van and further east, tectonics are dominated by the Bitlis Suture Zone (in eastern Turkey) and Zagros fold and thrust belt (toward Iran). The October 23, 2011 earthquake occurred in a broad region of convergence beyond the eastern extent of Anatolian strike-slip tectonics. The focal mechanism of today's earthquake is consistent with oblique-thrust faulting similar to mapped faults in the region.

This earthquake is a reminder of the many deadly seismic events that Turkey has suffered in the recent past. The devastating Izmit earthquake of 1999 (M = 7.6) broke a section of the North Anatolian Fault 1000 km to the west of the October 23 event and killed 17,000 people, injured 50,000, and left 500,000 homeless. Approximately 70 km from this earthquake a M7.3 earthquake occurred on November 11, 1976 destroying several villages near the Turkey and Iran border and killing several thousand people. A M7.8 earthquake struck Erzincan in 1939, killing an estimated 33,000 people.

(http://earthquake.usgs.gov/earthquakes/eqinthenews/2011/usb0006bqc/#details)

2011 Van earthquake

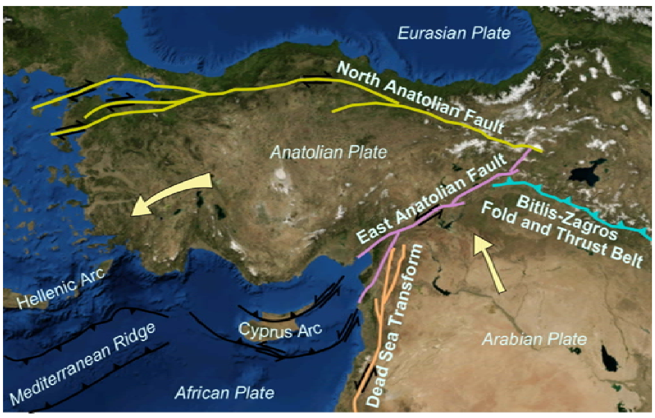
The **2011 Van earthquake** was a destructive magnitude 7.2 M_w earthquake that struck eastern Turkey near the city of Van on Sunday, 23 October 2011 at 13:41 local time. It occurred at a shallow depth of 20 km (12.4 mi), causing heavy shaking across much of eastern Turkey and was felt across neighbouring parts of the South Caucasus and Levant. Extensive areas sustained heavy damage to their structures, and as many as 1,000 people were feared dead.

Geology

The magnitude 7.2 (M_w) Eastern Highlands earthquake occurred inland on 23 October 2011 at 13:41 local time, centered about 16 km (9 mi) north-northeast of Van, Turkey and at an estimated focal depth of 20 km (12.4 mi). Its focal region and much of easternmost Turkey lie towards the southern boundary of the complex zone of continental collision between the Arabian Plate and the Eurasian Plate, beyond the eastern extent of the Armenian and Asia Minor fault zones. Part of the convergence between these two plates takes place along the Bitlis-Zagros fold and thrust belt. The earthquakes's focal mechanism indicates oblique thrust faulting, consistent with the expected tectonics in this region.

Due to its great intensity and shallow depth, the earthquake produced significant ground motions across a large area. Violent shaking measuring MM IX on the Mercalli scale occurred in Van, although widespread strong to severe (MM VI–VIII) shaking was observed in many smaller and less populated areas around the epicenter. Lighter but well-felt ground motions (MM V–III) spread much farther across the region, extending into surrounding countries such as Armenia, Azerbaijan, Georgia, Iran, Iraq, Israel and Syria.

The size of the rupture has been estimated as 60 km x 20 km, consistent with the observed distribution of aftershocks, on a WSW-ENE orientated fault plane with a dip of about 35°. An offset of about 2 m has been estimated at 10–15 km depth but there is no visible rupture of the ground surface. The rupture lasted for about 50 seconds.



Map showing main tectonic structures around the Anatolian Plate on a base taken from a snapshot from NASA's World Wind software. Arrows show displacement vectors of the Anatolian and Arabian Plates relative to the Eurasian Plate. The locations of the various structures were taken from many published maps.

Impact

The earthquake and its aftershocks affected much of eastern Turkey, demolishing hundreds of buildings and burying numerous victims under the rubble. Erciş, a town near Van, was hardest hit by the violent shaking; at least 55 destroyed buildings, 45 fatalities, and 156 injuries occurred in the town alone. Most of the buildings collapsed along the town's main road and were residential, raising the possibility of a higher death toll. In smaller villages near the epicenter, the shaking demolished almost all the brick houses.

In the city center of Van, at least 100 people were confirmed dead, and 970 buildings collapsed in and around the city. About 200 inmates escaped after the walls of a prison succumbed to the shaking, although 50 were quickly recaptured. The Van Ferit Melen Airport was damaged, but contradictory reports were given: According to NTV, airplanes were diverted to the neighboring cities, while according to the Anatolia News Agency, the earthquake did not disrupt the air traffic.

Twenty-four hours following the main shock the death toll stood at 264 but as many as a thousand are feared dead. Multiple news reports suggest up to 2300 are injured with many still caught under rubble. As of 25 October, rescue and aid efforts are still ongoing, as many as 40,000 people are believed to be homeless due to the considerable number of collapsed or damaged buildings. Latest reports suggest that casualties exceeds 550 and an estimated 2200 buildings are damaged or destroyed in the affected areas.

Response

As of October 23, The Turkish government had responded the disaster with 1275 personnel, 174 vehicles, 290 health officials, 43 ambulances, and 6 air ambulances. Local people also joined the rescue action, some using their bare hands. Survivors and opposition politicians have criticized the crisis management of the government.

On 27th of October AFAD announced that 13 million TL (around $7 million US) has been sent so far in terms of emergency relief efforts. Another 8.6 million TL (just under $5 million US) has been donated via charity so far. There are now a total of 3,826 search and rescue officers, 904 medical personnel, 18 search dogs, 651 construction equipment and vehicles, including 146 ambulances, 7 rescue choppers (air ambulances), 46 generators, 77 projectors, 95 portable toilets, 37 mobile kitchens, 3,051 kitchen sets, 6,359 catalytic stoves and a mobile oven in the disaster area. 25,185 tents sent by Turkish Red Crescent Society were distributed. 10 collective shelter tents, 60 prefabricated houses, 90 Mevlana Transitional Houses (translation needed) houses have also been erected. 109,986 blankets, 1,150 quilts and 5,109 sleeping bags have also been distributed. 3 meals a day are being provided with distribution of hot meals food etc. Also 30 field tents have been set up for public services and psychosocial trauma support.

As of October 27, in some sites, rescue work had been stopped where attention was turning to the needs of the survivors, however, there were still survivors found and saved from the rubble on the same day and thereafter. The government had announced that tents will be delivered to those whose homes were deemed unsafe rather than whoever lined up asking for one.

International

The European Union and NATO expressed their condolences and NATO offered help. The President of the *de facto* Turkish Republic of Northern Cyprus Derviş Eroğlu also sent condolences. Armenian President Serzh Sargsyan sent his condolences to Turkish President Abdullah Gül and offered immediate help. United States President Barack Obama said: "We stand shoulder to shoulder with our Turkish ally in this difficult time and are ready to assist the Turkish authorities."

Armenia, Azerbaijan, Bulgaria, China, Denmark, Georgia, Germany, Greece, Hungary, Iran, Ireland, Israel, Japan, Kosovo, New Zealand, Pakistan, Poland, Portugal, Russia, South Korea, Sweden, Switzerland, Taiwan, Ukraine, the United Kingdom, and the United States also offered Turkey aid after the earthquake.

Turkish President Abdullah Gül, said that Turkish teams were capable of handling the disaster management. Thus, as of 23 October, Turkey stated that it had acknowledged but declined all the aid proposals with the exception of neighbouring Azerbaijan, Bulgaria, and Iran, with aid and rescue workers arriving at the affected area shortly after the quake struck without notifying Ministry of Foreign Affairs. The Iranian Red Crescent set up relief camps to accommodate people made homeless by the quake. Several injured were transferred for treatment to the Iranian border city of Khoy. However, on 25 October, Turkey announced that it would be requesting aid from 30 countries. After request, Israel airlifted mobile homes to the devastated region. Armenian government sent 40 tons of cargo to Turkey, including tents, sleeping bags, blankets and bedding.

The Turkish government is looking for tents, prefabricated houses, and living containers. The United Nations was sending thousands of tents as well as blankets and mattresses from October 28 on.

The U.N. Office for the Coordination of Humanitarian Affairs (OCHA) stated that Erzurum would be a hub for international assistance sent by plane, and Van had been asked to establish a centre for assistance coming overland.

(Wikipedia,
http://en.wikipedia.org/wiki/2011_Van_earthquake)

Up to 1,000 feared killed as earthquake hits eastern Turkey

As many as 1,000 people were feared killed today when a powerful earthquake struck Turkey, collapsing dozens of buildings and pulling down phone and power lines in the southeast of the country, officials and witnesses said.

Emergency workers battled to rescue people trapped in buildings in the city of Van and surrounding districts on the banks of Lake Van, near Turkey's border with Iran.

"We heard cries and groaning from underneath the debris, we are waiting for the rescue teams to arrive," Halil Çelik, a young man who lived in the centre of the city, told Reuters as he stood beside the ruins of building that had collapsed before his eyes.

"All of a sudden, a quake tore down the building in front of me. All the bystanders, we all ran to the building and rescued two injured people from the ruins."

Turkey's Kandilli Observatory and Earthquake Research Institute said the magnitude 7.2 earthquake struck at 1041 GMT and was five kilometers deep.

Around 10 buildings collapsed in Van city and about 25-30 buildings were brought to the ground in the nearby district of Erciş, Deputy Prime Minister Beşir Atalay told reporters.

"We estimate around 1,000 buildings are damaged and our estimate is for hundreds of lives lost. It could be 500 or 1,000," Kandilli Observatory general manager Mustafa Erdik told a news conference.

Cihan news agency reported that there were more than 50 dead bodies at a hospital in Erciş, a town near Van, near the quake's epicentre.

Prime Minister Tayyip Erdogan was travelling to Van and the cabinet was expected to discuss the quake at a meeting called for Monday morning.

"A lot of buildings collapsed, many people were killed, but we don't know the number. We are waiting for emergency help, it's very urgent," Zülfükar Arapoğlu, the mayor of Erciş, told news broadcaster NTV.

Cihan news agency said that of the dead, 30 had been killed in Erciş district where some 80 buildings had collapsed.

"We need tents urgently and rescue teams. We don't have any ambulances, and we only have one hospital. We have many killed and injured," Arapoğlu said.

Turkey's Red Crescent said one of its local teams was helping to rescue people from a student residence in Erciş. It said it was sending tents, blankets and food to the region.

More than 20 aftershocks shook the area, further unsettling residents who ran out on the streets when the initial strong quake struck. Television pictures showed rooms shaking and furniture falling to the ground as people ran from one building.

Dozens of emergency workers and residents crawled over a multi-storey building in Van as they searched for any people trapped in side.

Elsewhere, vehicles were crushed in the street by falling masonry while dazed-looking people wandered past.

Some 50 injured people were taken to hospital in Van, state-run Anatolian news agency reported, but it did not give details on how serious their injuries were.

Turkish media said phone lines and electricity had been cut off. The quake's epicentre was at the village of Tabanlı, 20 km north of Van city, Kandilli said.

In Hakkari, about 100 km south of Van, a Reuters correspondent said the building he was in swayed for about 10 seconds during the quake. But there was no immediate sign of casualties or damage in the town, which is about two and a half hours drive through the mountains from Van.

Major geological fault lines cross Turkey and small earthquakes are a near daily occurrence. Two large quakes in 1999 killed more than 20,000 people in northwest Turkey.

An earthquake struck Van province in November 1976 with 5,291 confirmed dead. Two people were killed and 79 injured in May when an earthquake shook Simav in northwest Turkey.

(Hurriyet Daily News, 23 October 2011, http://www.hurriyetdailynews.com/n.php?n=update-5-strong-earthquake-hits-turkey-up-to-1000-feared-killed-2011-10-23)

Powerful Earthquake Strikes Eastern Turkey

ISTANBUL—A powerful 7.2-magnitude earthquake struck eastern Turkey on Sunday, collapsing apartment buildings and cutting communications and power in the city of Van and its surroundings.

By Monday midday, Prime Ministry's office in Turkey put the death toll at 264 and the number of wounded at 1,300, as the number kept rising quickly and the full picture of the damage was still unclear.

"There are no longer damaged areas that have not been reached," Deputy Prime Minister Besir Atalay said, adding that most affected areas were the cities of Van and Ercis, as well as nearby villages.

"Altogether 7,000 tents have been set up, 5,000 of them in Ercis," he told.

According to the Prime Ministry's emergency agency, the earthquake destroyed or damaged 970 buildings in the region, and over 2,300 search and rescue teams were working on the field.

Prime Minister Recep Tayyip Erdogan, who visited the area late Sunday, said that this earthquake, too, will be overcome.

"We will not leave our citizens alone in this winter cold," he promised.

An eyewitness said a number of buildings in central Van collapsed, leaving people panicked in the streets, while as many as 1,000 people were thronging outside the local hospital.

After the quake, more than a dozen aftershocks were felt, according to Turkish television. The strongest one, at magnitude 5.7, shook Van just before midnight local time, when Mr. Erdogan was still visiting the region.

The prime minister's rapid response to the quake in the mainly ethnic-Kurdish region signaled the seriousness of the quake, and also the political importance of handling the disaster effectively.

The militant Kurdistan Workers' Party, or PKK, is active in the region where the quake struck, and has many supporters there. Mr. Erdogan is working hard to win backing from ordinary Kurds for his effort to crush or marginalize the PKK.

In the town of Van, Sabahattin Alkan, who runs a tourism company, said, "The situation here is really bad. A lot of buildings have collapsed. There are no communications with the villages, so we don't know what is happening out there." His own home was severely damaged but standing, he said.

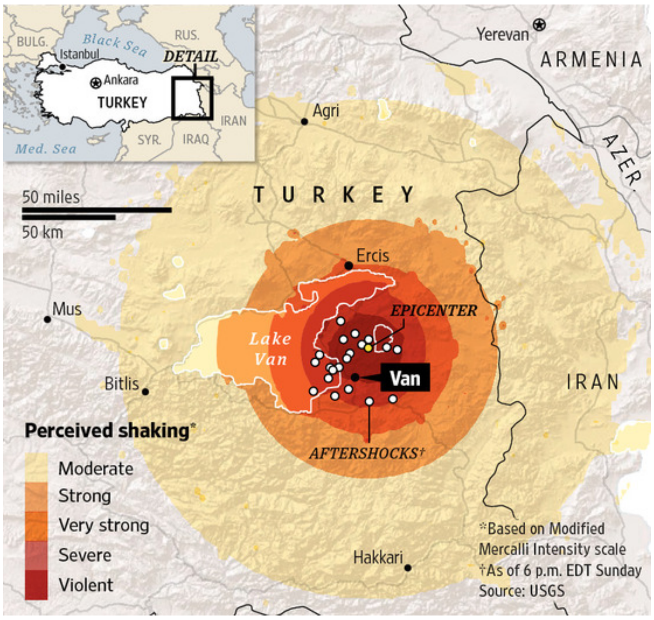
"A lot of people are trying to get out of town to stay with relatives in the villages," Mr. Alkan said. Power was down, he said. Rescue teams were using generators to light rubble in the dark, said Nasuh Maruki, director of AKUT, a Turkish rescue organization.

Around 10 buildings collapsed in Van, Deputy Prime Minister Besir Atalay told reporters.

The Kandilli Observatory and Earthquake Research Institute in Istanbul estimated the strength of the quake at 7.2 and said the death toll could rise to between 500 and 1,000. The observatory said aftershocks could continue for days or weeks.

That could complicate recovery as the risk of aftershocks keeps people out of their homes. Van is at an altitude of 1,750 meters, (5,750 feet), and snow is forecast this week.

Azerbaijan, Iran and Bulgaria sent rescue teams to the area, Mr. Erdogan told reporters, and the prime minister said numerous offers from other countries will also be considered if necessary.



Turkey, which sits atop two major earthquake faults, has extensive experience in earthquake rescue. Some 1,000 rescue personnel, medics and engineers, as well as search dogs and tents, were sent to the region from around Turkey, a spokesman for AFAD, Turkey's Emergency Management Agency, said.

Van suffered a large earthquake in 1976, when more than 5,000 people died. Turkey's most recent catastrophic earthquake was in 1999, around 60 miles east of Istanbul, when at least 17,000 people were killed. In 1939, 33,000 people were killed in a quake in Erzincan, also in eastern Turkey.

Israel, with which Turkey recently downgraded diplomatic relations, offered help dealing with the quake, as did the U.S., Greece and several other nations, Turkey's state Anadolu news agency reported. Relations between Israel and Turkey have deteriorated sharply over Israel's refusal to apologize for the killing of nine pro-Palestinian activists from Turkey by Israeli commandos last year, when the troops boarded a Turkish aid ship that was seeking to break Israel's blockade of Gaza.

"At this difficult time Israel is willing to provide any aid required anywhere in Turkey and at any time," Israeli President Shimon Peres told his Turkish opposite, Abdullah Gul, in a phone call, according to a statement on the Israeli president's website, Reuters said.

It wasn't clear if Turkey would accept Israel's offer of help. "Turkey has not made any request for international assistance. For now we are thanking whoever calls and noting their offer," said Turkish foreign ministry spokesman Selcuk Unal. "We will be able to evaluate our particular needs after the relevant authorities have a real picture of what is going on."

Rivals Turkey and Greece broke the ice in their relationship in so-called earthquake diplomacy in 1999, when the large quake hit Istanbul. Greece and Turkey had come close to war in the mid-1990s over territorial disputes in the Aegean Sea.

The quake struck at 1:41 p.m. local time, its epicenter 16 kilometers (10 miles) north-northeast of Van, the U.S. Geological Survey said. The quake was at a depth of 20 kilometers (12.5 miles), according to the U.S. agency.

Van, with a population of just over one million, is close to the border with Iran. The wider region was already in turmoil, after Kurdish militants killed 24 Turkish soldiers on Wednesday, prompting a large-scale military response from Turkey on either side of the border with Iraq, some 200 kilometers (125 miles) south of Van.

On Sunday, the military's general staff said it had sent three transport planes and natural-disaster teams to the earthquake zone. In a separate statement Sunday evening, the general staff said operations against the PKK were continuing.

—Joshua Mitnick in Jerusalem contributed to this article.

(Marc Champion and Ayla Alabayrak / The Wall Street Journal, October 24, 2011, http://online.wsj.com/article/SB10001424052970204777904576648781428661342.html?mod=dist_smartbrief#project%3DSLIDESHOW08%26s%3DSB10001424052970204777904576649442573967966%26articleTabs%3Dslideshow)

Reverse Fault Earthquake

BGS head of seismic hazard and archives Roger Musson said yesterday's quake was a "reverse fault" type. This is where the hanging wall moves up relative to the foot wall, and causes greater ground movements than a traditional earthquake.

(New Civil Engineer, 24 October, 2011, http://www.nce.co.uk/news/geotechnical/earthquake-death-toll-continues-to-rise-in-turkey/8621543.article)

World reacts to earthquake in eastern Turkey

Many countries from all over the world offered help and condolences to Turkey after an earthquake measuring 7.2 on the Richter scale hit the eastern province of Van on Sunday.

At least 217 people were killed and 700 others were wounded, while 970 buildings were demolished in the earthquake.

Rescuers take part in an operation to salvage people from a collapsed building after an earthquake in eastern Turkey that killed at least 217 people.

The United States, Britain, Greece, Azerbaijan, Pakistan, Israel, Ireland, Poland, Hungary, Switzerland, Bulgaria, Georgia, China, Ukraine, Russia, Canada, South Korea, Japan, Iran, Kosovo, the EU, NATO and the U.N. offered to help Turkey after the earthquake.

"We stand shoulder to shoulder with our Turkish ally in this difficult time and are ready to assist the Turkish authorities," U.S. President Barack Obama said in a statement. "On behalf of the American people, I express my deepest condolences to the families of the victims. Our thoughts and prayers are with the brave men and women who are working to bring assistance to this stricken region."

Presidents of Turkish Republic of Northern Cyprus (TRNC), Azerbaijan, the U.S., France, Israel, Serbia and Iraq; Secretary General Ekmeleddin Ihsanoglu of the Organization of the Islamic Cooperation (OIC); President of the European Council Herman Van Rompuy; European Parliament Presdent Jerzy Buzek; U.N. Secretary-General Ban Ki-moon; and foreign ministers of Germany, Britain, the U.S. and Ireland called Turkish officials and offered help and condolences.

NATO Secretary General Anders Fogh Rasmussen also released a statement showing support in the wake of the disaster, stating: ""NATO stands ready to assist our ally Turkey, if needed."

(Monday, October 24, 2011, Anatolia News Agency)

Διάσωση

The earthquake collapsed several buildings in Van province on Oct. 23, 2011, trapping an unknown number of people under debris.

Rescue workers try to salvage people from collapsed buildings after a powerful earthquake rocked eastern Turkey, in the city of Ercis, Van province, Turkey, 24 October 2011.

Οι σωστές αντισεισμικές κατασκευές είναι ο μόνος τρόπος αντιμετώπισης των ισχυρών σεισμών

Designing for Safety in Turkey and Other Earthquake Zones

The latest earthquake in Turkey — that country's strongest in a decade — provides a fresh reminder of the deep vulnerability created by weak building designs in the world's crowded seismic danger zones. There will be more horror to come there and in other places prone to powerful quakes.

But don't be tempted to write off high death counts from building collapses in shaky developing countries as simply another unavoidable consequence of poverty. There are designs suitable for schools and other structures that are fundamentally stronger than those typical in such regions and only require configuring common materials in different ways.

I've written here often about one such design, by Santiago Pujol of Purdue University. Now I've posted a freshly edited video (incorporating an animated graphic by my elder son, Daniel) that conveys how simply rearranging the same batch of bricks, columns and windows can create a resilient structure on a budget.

So there's no difference in cost or materials. All that's needed is awareness and motivation. The head of the office of the International Strategy for Disaster Reduction, a United Nations body, has said that the collapse of almost 1,000 buildings "underlines the importance of providing the right incentives and information to builders and property owners in the world's most dangerous earthquake zones."

The Open Architecture Network is one experiment in getting smart designs where they need to go. I'd love to know of more.

And of course this issue is hardly restricted to poor regions of the world. There's, as well, with Oregon being a glaring case in point.

(Andrew C. Revkin, October 23, 2011, http://j.mp/dorQuakeDesign)

"Poor" construction blamed for structural damage in Turkey's quake

Amid Debris in Turkey, Survivors and Signs of Poor Construction

A building in Ercis, Turkey, that collapsed Sunday.

ISTANBUL — Rescue teams continued on Tuesday to pull survivors from piles of twisted metal and chunks of concrete in eastern Turkey, a region devastated by a major earthquake on Sunday afternoon.

Rescuers tended on Tuesday to a 2-week-old baby named Azra, one of more than 30 people who have been found alive in the rubble.

Aerial photographs on Tuesday from the eastern province of Van showed devastation in Ercis, where more than 50 buildings on a main road had collapsed and rooftops were pancaked. In surrounding villages, many mud-brick buildings were demolished.

Questions were raised about the quality of construction in the area, with some buildings having remained completely intact while those next door were destroyed. The region is officially designated as earthquake prone, along with many other areas of Turkey that contain active faults.

"We saw the construction material in many demolished areas to be merely sand, randomly mixed with pebble, that fell into pieces with minor force," an emergency worker said on NTV television. "Here, you see," he said as he crumbled a large stone into dust in his hand.

On Tuesday, more than 200 specialists were busy assessing the damage in Van and neighboring communities. With large red cross marks, they noted structures they determined to be unstable. Many people were unwilling to return home, even if their houses had survived the destruction.

(Sebnem Arsu / New York Times, October 25, 2011)

Turkey's prime minister blasts building industry

Following devastating earthquakes a decade ago, Turkey imposed tougher building codes, but enforcement has been weak. With Sunday's earthquake destroying hundreds of buildings, Prime Minister Recep Tayyip Erdogan said the failure of "local councils, building contractors and inspectors" to check concrete quality should be seen as criminal negligence.

Big quake in Turkey highlights shoddy construction

Prime Minister Recep Tayyip Erdogan on Wednesday accused Turkey's construction industry of criminal neglect, saying shoddy work had contributed to the collapse of buildings when a 7.2-magnitude earthquake hit southeastern Turkey on Sunday.

VAN, Turkey — Prime Minister Recep Tayyip Erdogan on Wednesday accused Turkey's construction industry of criminal neglect, saying shoddy work had contributed to the collapse of buildings when a 7.2-magnitude earthquake hit southeastern Turkey on Sunday.

Meanwhile, rescue workers in Ercis, one of the worst-hit cities, pulled three survivors from the rubble of a collapsed building after 67 hours.

The official death toll stands at 461, although it was expected to climb. Rescuers were continuing to look for survivors.

Despite tough safety codes approved a decade ago after earthquakes killed 18,000 people and prompted an outcry over the poor quality of construction, enforcement has remained lax.

Some residents in Ercis said some of that city's pancaked buildings lacked steel support rods and sufficient concrete, and accused builders of sacrificing safety for speed and economy.

"Death comes from God. But what about poor construction?" asked Nevzat Altinkaynak. "Look at this building. It was new. It didn't even have paint on it yet!"

The Turkish army's search and rescue unit tries late Wednesday to reach people trapped under debris of a collapsed building in Ercis, Van province in eastern Turkey.

Erdogan said the failure of local councils, building contractors and inspectors to check the use of poor-quality concrete in buildings that crumbled during the earthquake amounted to criminal neglect.

"The painful price was paid by the people inside," Erdogan said. Negligence on the part of local councils, building contractors and inspectors should be seen as a crime, he added.

He conceded that state aid was insufficient in the hours immediately after the quake. "We were not successful in the first 24 hours. We admit that," Erdogan said, adding that aid operations were since running smoothly.

He promised that Van, the capital of the province of the same name where the quake was centered, would be rebuilt "in a short space of time." Nearly 2,300 buildings in the province were destroyed.

Some engineers said the quake was so strong that even properly built buildings would have collapsed.

Shaking associated with a magnitude-7.2 quake "can cause collapse of buildings even with moderate seismic design and quality construction," according to Mishac Yegian, a professor of civil engineering at Northeastern University in Boston.

In other areas of Van province, survivors got into fistfights over relief supplies such as tents and food.

Meanwhile, the government did an about-face on its previous rejection of offers of help from other countries, even accepting an offer of mobile homes from Israel, with whom relations have become increasingly strained in the past year.

The southeast province of Van borders Iran, and the population is made up mainly of Turkey's Kurdish minority.

Material from The Associated Press is included in this report.

(Carsten Hoffmann and Jasper Mortimer / The Seattle Times - Deutsche Presse-Agentur, October 27, 2011)

Some buildings in Van has totally leveled as others stand still after a huge quake, a proof that construction firms failed in some resistance tests to cut costs, critics argue.

Legislation allows contracting firms to agree with the construction inspection companies of their choice, which gives way to abuses requirements, Ağaoğlu says.

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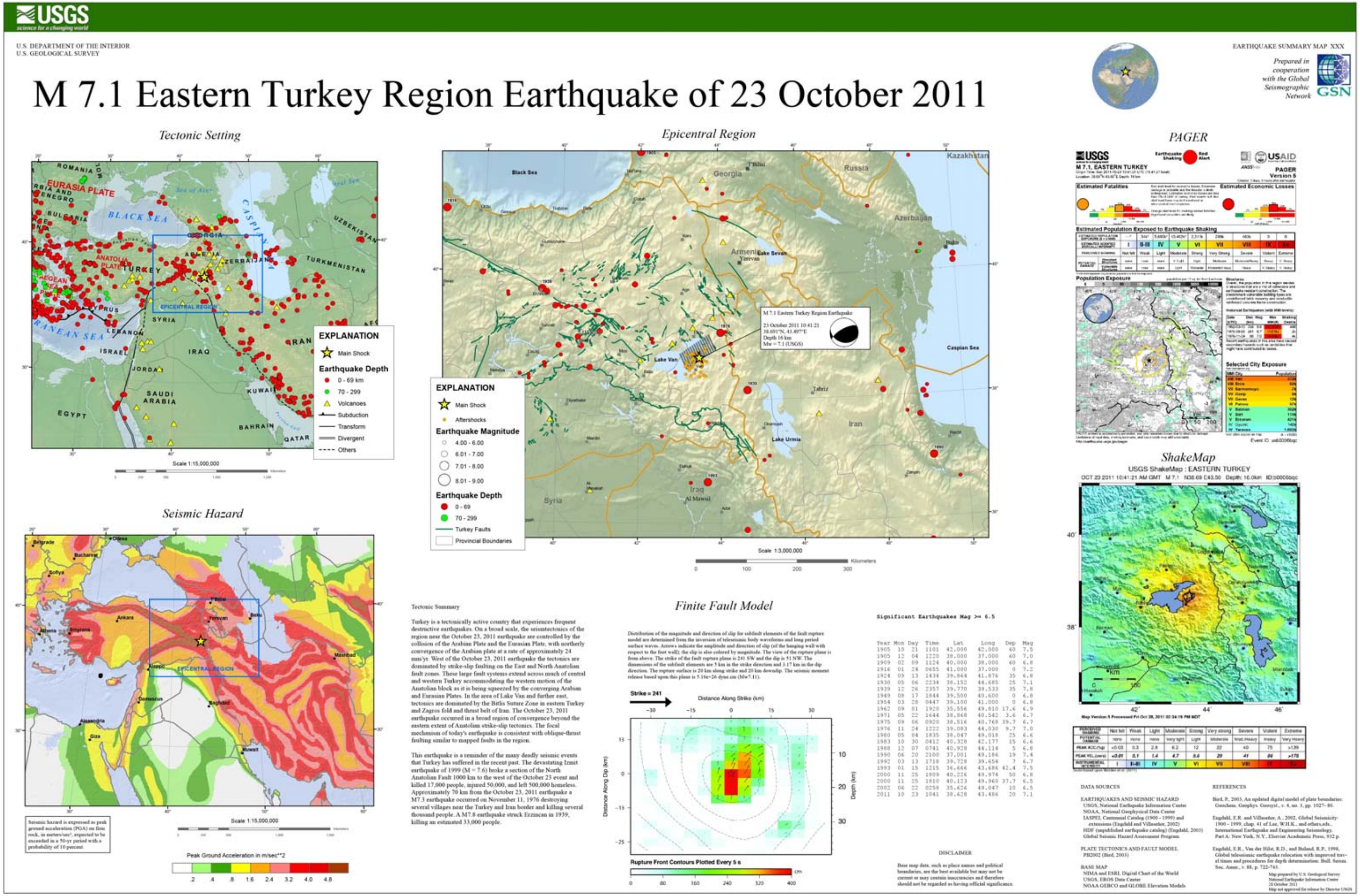
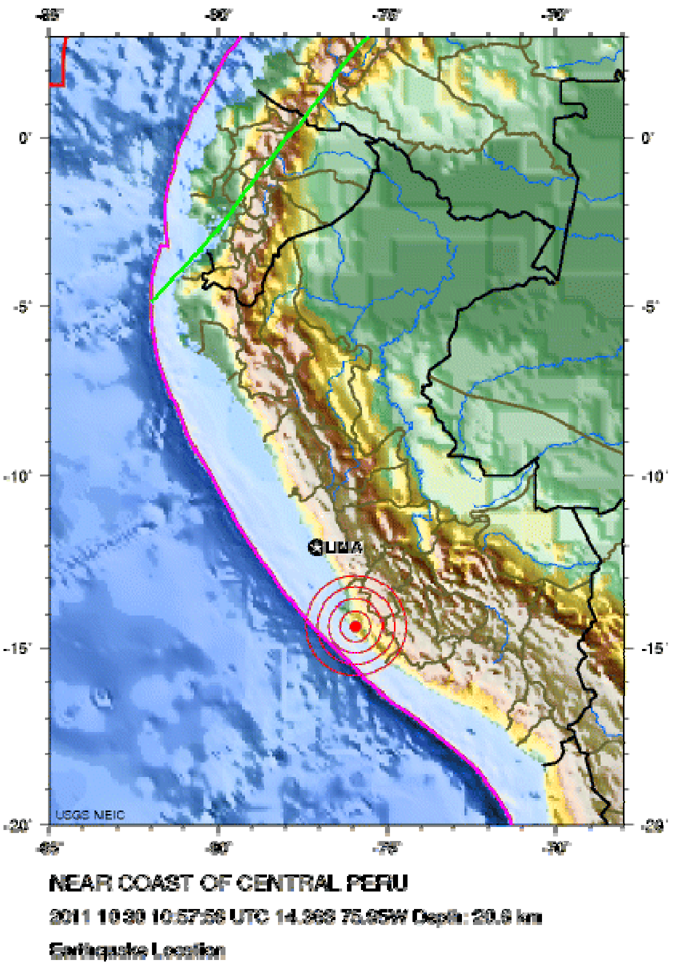

USGS
science for a changing world
U.S. DEPARTMENT OF THE INTERIOR
U.S. GEOLOGICAL SURVEY
EARTHQUAKE SUMMARY MAP XXX
Prepared in cooperation with the Global Seismographic Network
GSN
M 7.1 Eastern Turkey Region Earthquake of 23 October 2011
Tectonic Setting
EXPLANATION
Main Shock
Earthquake Depth
0 - 69 km
70 - 299
Volcanoes
Subduction
Transform
Divergent
Others
Scale 1:15,000,000
Epicentral Region
M 7.1 Eastern Turkey Region Earthquake
23 October 2011 10:41:21
38.691°N, 43.497°E
Depth 16 km
Mw = 7.1 (USGS)
EXPLANATION
Main Shock
Aftershocks
Earthquake Magnitude
4.00 - 6.00
6.01 - 7.00
7.01 - 8.00
8.01 - 9.00
Earthquake Depth
0 - 69
70 - 299
Turkey Faults
Provincial Boundaries
Scale 1:3,000,000
Kilometers
PAGER
ShakeMap
USGS ShakeMap : EASTERN TURKEY
Seismic Hazard
Scale 1:15,000,000
Peak Ground Acceleration in m/sec**2
Tectonic Summary
Turkey is a tectonically active country that experiences frequent destructive earthquakes. On a broad scale, the seismotectonics of the region near the October 23, 2011 earthquake are controlled by the collision of the Arabian Plate and the Eurasian Plate, with northerly convergence of the Arabian plate at a rate of approximately 24 mm/yr. West of the October 23, 2011 earthquake the tectonics are dominated by strike-slip faulting on the East and North Anatolian fault zones. These large fault systems extend across much of central and western Turkey accommodating the western motion of the Anatolian block as it is being squeezed by the converging Arabian and Eurasian Plates. In the area of Lake Van and further east, tectonics are dominated by the Bitlis Suture Zone in eastern Turkey and Zagros fold and thrust belt of Iran. The October 23, 2011 earthquake occurred in a broad region of convergence beyond the eastern extent of Anatolian strike-slip tectonics. The focal mechanism of today's earthquake is consistent with oblique-thrust faulting similar to mapped faults in the region.
This earthquake is a reminder of the many deadly seismic events that Turkey has suffered in the recent past. The devastating Izmit earthquake of 1999 (M = 7.6) broke a section of the North Anatolian Fault 1000 km to the west of the October 23 event and killed 17,000 people, injured 50,000, and left 500,000 homeless. Approximately 70 km from the October 23, 2011 earthquake a M7.3 earthquake occurred on November 11, 1976 destroying several villages near the Turkey and Iran border and killing several thousand people. A M7.8 earthquake struck Erzincan in 1939, killing an estimated 33,000 people.
Finite Fault Model
Distribution of the magnitude and direction of slip for subfault elements of the fault rupture model are determined from the inversion of teleseismic body waveforms and long period surface waves. Arrows indicate the amplitude and direction of slip (of the hanging wall with respect to the foot wall); the slip is also colored by magnitude. The view of the rupture plane is from above. The strike of the fault rupture plane is 241 SW and the dip is 51 NW. The dimensions of the subfault elements are 5 km in the strike direction and 3.17 km in the dip direction. The rupture surface is 20 km along strike and 20 km downdip. The seismic moment release based upon this plane is 5.16e+26 dyne.cm (Mw7.11).
Strike = 241
Distance Along Strike (km)
Distance Along Dip (km)
Depth (km)
Rupture Front Contours Plotted Every 5 s
Significant Earthquakes Mag >= 6.5
Year Mon Day Time Lat Long Dep Mag
1905 10 21 1101 42.000 42.000 60 7.5
1905 12 04 1220 38.000 37.000 60 7.0
1909 02 09 1124 40.000 38.000 40 6.8
1916 01 24 0655 41.000 37.000 0 7.2
1924 09 13 1434 39.864 41.876 35 6.8
1930 05 06 2234 38.152 44.685 25 7.1
1939 12 26 2357 39.770 39.533 35 7.8
1949 08 17 1844 39.500 40.600 0 6.8
1954 03 28 0447 39.100 41.000 0 6.8
1962 09 01 1920 35.556 49.810 17.6 6.9
1971 05 22 1644 38.868 40.542 3.6 6.7
1975 09 06 0920 38.516 40.768 39.7 6.7
1976 11 24 1222 39.083 44.030 9.7 7.0
1980 05 04 1835 38.047 49.018 25 6.6
1983 10 30 0412 40.328 42.177 15 6.6
1988 12 07 0741 40.928 44.114 5 6.8
1990 06 20 2100 37.001 49.186 19 7.4
1992 03 13 1718 39.728 39.654 7 6.7
1993 01 15 1215 36.466 43.686 42.4 7.5
2000 11 25 1809 40.226 49.974 50 6.8
2000 11 25 1810 40.123 49.960 37.7 6.5
2002 06 22 0258 35.424 49.047 10 6.5
2011 10 23 1041 38.628 43.486 20 7.1
DISCLAIMER
DATA SOURCES
REFERENCES

Ο Σεισμός της 28ης Οκτωβρίου στο Περού

Earthquake Details

Magnitude	**6.9**
Date-Time	**Friday, October 28, 2011 at 18:54:33 UTC**
Location	14.515°S, 76.009°W
Depth	23.9 km (14.9 miles)
Region	NEAR THE COAST OF CENTRAL PERU
Distances	51 km (31 miles) SSW of **Ica, Peru** 112 km (69 miles) S of **Chincha Alta, Peru** 201 km (124 miles) W of **Puquio, Peru** 288 km (178 miles) SSE of **LIMA, Peru**



(http://earthquake.usgs.gov/earthquakes/eqinthenews/2011/usb0006fv2/)

Earthquake Central Peru – 104 people injured, 1,430 homeless and 92 houses collapsed so far

A 6.9 magnitude earthquake hit near the coast of Central Peru. The earthquake hit at 01:54 PM local time (18:54 UTC). Initial USGS data stated that the epicenter was on the coastline approx. 50 km from Ica, a big Peruvian city. Lucky escape for Ica, as the Peruvian seismological agency IGP did locate the epicenter at 117 km from Ica.

The affected zones where : Ica, Oalpa, Pisco, Chincha and Canete. In his latest report Indeci said that 2,575 people were affected by the earthquake, 92 houses had collapsed, 194 houses were uninhabitable and 515 houses were damaged.

A collapsed house due to the October 28 2011 earthquake in Ica province, Peru - Image courtesy and copyright Region Centro LaRepublica Peru

The Cathedral from ICA will be demolished as the total structure become destabilized and would collapse anyway with the next serious earthquake.

La Republica Peru quotes Seismologist Julio Kuroiwa in saying that yesterdays very strong earthquake could be called an "aftershock" of the massive 2007 earthquake. Massive earthquakes can trigger very strong to massive aftershocks for decades. Mr. Koraiwa compared both the 2007 earthquake with yesterday's aftershock, as he called it. The 2007 7.9 magnitude earthquake was 30 times stronger than the one from Friday.

He also said that to generate a tsunami the magnitude has to be at least 7.2 and be very shallow. (*ER … these are the words of the seismologist, not ours – tsunamis are a very difficult subject and cannot be generalized on a worldwide scale. Every coastline is different and magnitudes to trigger tsunamis do vary a lot. Additionally, the local aspect may never be forgotten. For example in this case, we at earthquake-report.com are always alerted when the epicenter is shallow and it is located on the steep slopes of underwater mounts. Here the level difference between the top of the South America plate and the base of the Nazca plate was 3000 m! Landslides below sea level have generated destructive local tsunamis in the past. Luckily, here everything was kept well together.*)

(Armand Vervaeck, James Daniell, Szombath Balazs / EartQuake-Report, October 28, 2011)

ΠΡΟΣΕΧΕΙΣ ΕΚΔΗΛΩΣΕΙΣ ΕΛΛΗΝΙΚΟΥ ΕΝΔΙΑΦΕΡΟΝΤΟΣ

ΑΡΙΣΤΟΤΕΛΕΙΟ ΠΑΝΕΠΙΣΤΗΜΙΟ ΘΕΣΣΑΛΟΝΙΚΗΣ
ΠΟΛΥΤΕΧΝΙΚΗ ΣΧΟΛΗ
ΤΜΗΜΑ ΠΟΛΙΤΙΚΩΝ ΜΗΧΑΝΙΚΩΝ
ΠΡΟΓΡΑΜΜΑ ΜΕΤΑΠΤΥΧΙΑΚΩΝ ΣΠΟΥΔΩΝ
ΑΝΤΙΣΕΙΣΜΙΚΟΣ ΣΧΕΔΙΑΣΜΟΣ ΤΕΧΝΙΚΩΝ ΕΡΓΩΝ

Διάλεξη στο πλαίσιο του μεταπτυχιακού προγράμματος σπουδών ΑΣΤΕ (Αντισεισμικός Σχεδιασμός Τεχνικών Έργων) του Τμήματος Πολιτικών Μηχανικών την Παρασκευή 11 Νοεμβρίου 2011, ώρα 13:00 στην Αίθουσα Συνεδριάσεων του 1ου Ορόφου του κτιρίου της Υδραυλικής του Τμήματος Πολιτικών Μηχανικών στην οποία θα μιλήσει ο Prof. Mustafa Erdik, Professor of Earthquake Engineering, Kandilli Observatory and Earthquake Research Institute, Bogazici University, Istanbul με θέμα: "Earthquake Rapid Response and Early Warning System in Istanbul".

Mustafa Erdik is a Professor of Earthquake Engineering at, and currently serves as the Director of, Kandilli Observatory and Earthquake Research Institute in Bogazici University in Istanbul. He has worked with UNESCO, UNIDO, UNDP and several international foundations around the world on earthquake engineering problems. He is a member of the editorial board of several professional journals. He serves in the executive board of several professional societies and establishments, including Turkish Catastrophe Insurance Pool. He has authored or co-authored more than 200 scientific papers and 5 books. In 1999 he was elected as the laureate of United Nations Sasakawa Disaster Prevention Award and in 2004 he has received the NATO Science for Peace – Summit Prize. His current research interest is on earthquake hazard and risk assessment. Born in Ankara, Turkey, Dr. Erdik received a B.S. degree (1970) from Middle East Technical University, Turkey, and the degrees of M.S. (1972) and Ph.D. (1975) from Rice University in Houston, Texas.

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ΠΡΟΣΚΛΗΣΗ

Η Ελληνική Ένωση του Ινστιτούτου Πολιτικών Μηχανικών Ηνωμένου Βασιλείου (έδρα Λονδίνο), σε συνεργασία με τον Έλληνα αντιπρόσωπο «Τρύφωνα Σπ. Νικόλαο» των ακολούθων γερμανικών εταιρειών, σας προσκαλεί σε σεμινάριο με τα εξής θέματα:

Όμιλος «Bauer Maschinen GmbH»
Θέμα: Εξοπλισμός & συστήματα για γεωτεχνικές κατασκευές (φρέζα τάφρου, ανάμειξη εδάφους, πάσσαλοι με εκτόπιση εδαφικού υλικού)
Ομιλητές: Mr. Schopf Manfred (Senior Consulting Engineer) και
Mr.Lammle Tim (Civil Engineer, Sales Director VT11)

Εταιρεία «Friedr.Ischebeck GmbH»
Θέμα: Συστήματα αγκυρίων Ischebeck-TITAN
Ομιλητές: Mr. Lahme Stefan (European Sales Representative)

Τόπος: Αμφιθέατρο J&P-Αβαξ Α.Ε. Αμαρουσίου-Χαλανδρίου 16, Παράδεισος Αμαρουσίου
Ημερομηνία: 9 Νοεμβρίου 2011
Ώρα: 18.00-21.30
Γλώσσα: Αγγλικά
Διάλειμμα με καφέ και βουτήματα
Κόστος συμμετοχής: δωρεάν

Παρακαλούμε δηλώσετε την συμμετοχή σας (ονοματεπώνυμο και τηλέφωνο) μέχρι 7^{η} Νοεμβρίου 2011 στον κ. Μιχάλη Χατζηχαμπή στο email mhadjihambis@jp-avax. gr

ΑΡΘΡΑ

The Civil Engineer

The first modern civil engineer in Great Britain was John Smeaton (1724-1792); his life work was memorialised in 1994 by the dedication of a plaque in the north aisle of Westminster Abbey. Windows above commemorate Sir Benjamin Baker (the Forth Bridge), Parsons (the steam turbine), Lord Kelvin and Sir Henry Royce; nearby are memorials to Thomas Telford, James Watt, Isambard Kingdom Brunel and George and Robert Stephenson; this is the "Engineers Corner" of the Abbey. Close at hand are architects (Sir George Gilbert Scott, Sir Charles Barry, John Pearson) and scientists and mathematicians - the monument to Newton is justly magnificent.

It is right that architects, engineers, scientists and mathematicians should be grouped together. Some activities involve all four of the professions, and, in particular, it is sometimes hard to distinguish between the work of engineers and scientists. Engineers use Newton's mathematics and Faraday's physical laws; engineers and scientists have a common technical language to describe the tools at their disposal. However, there is a difference in the way those tools are deployed. Scientists use the tools to deepen understanding of their own subject, while engineers use the same tools in order to do something, whether it be to design a turbine blade, an electronic circuit, or a radio telescope; to drive a tunnel under the Channel; or to create a great building - a Gothic cathedral or a steel-framed skyscraper.

Smeaton's scientific work, recognised by his election to the Royal Society at the early age of 28, resulted directly from his need to establish a theoretical basis for his engineering projects - it is in this sense that he may be described as a modern engineer. In the seventeenth century the Royal Society, and in France the *Académie*, were in no doubt that the "science" their members studied should be of immediate and practical use; this, indeed, was the whole intent of Francis Bacon's "new philosophy". However, the split between "science" and "engineering" widened quickly, and as early as 1783, for example, Cambridge University created a Professorship of Natural Experimental Philosophy to ensure that engineering developed as a discipline in its own right. Earlier, in 1749, a technical university had been established at Mézières in France in order to teach hydraulics, earthworks and surveying to young army officers (and the great *Écoles*, and the *Polytechnique*, were established before the turn of the century).

However, the theory taught in the universities in the eighteenth century was not adequate for those engineers engaged in "the art of directing the great sources of power in Nature for the use and convenience of man" (to use Thomas Telford's words of 1828 as first President of the Institution of Civil Engineers). An engineer in charge of a major project, well-schooled though he may have been, was forced to make his own experiments and to develop his own scientific theory. Smeaton was particularly well-read, and his library included major works from both sides of the Channel (Newton's Principia, of course, but also Bélidor's *Architecture hydraulique* of 1735, Desagulier's *Experimental Philosophy* of 1744, a Vitruvius, and so on). However, it was known that a great range of engineering problems required urgent attention, and the Royal Society, and the Académie, offered prizes from time to time for their solution.

The four great problems in structural engineering throughout the eighteenth century were the strength of beams, the strength of columns, the thrust of arches and the thrust of soil (that is, the behaviour of soil behind a retaining wall, a problem in the field of what is now called soil mechanics). When Charles Coulomb, as a recent graduate of Mézières, was sent as a young army officer to fortify the island of Martinique (against the attacks, among others, of the British), he found that he lacked the theory for each of these four problems. He needed solutions in order to design his fortifications; on his return to Paris after nine years abroad, he presented his contributions to theory to the *Académie* in a notable paper of 1773. (The fourth section of this paper is a fundamental contribution to the science of soil mechanics, of which Coulomb is regarded by engineers as the founder. He is remembered by physicists - who do not know of him as a civil engineer - for his later work on electric charges.)

Smeaton, like Coulomb, was interested in a broad range of topics, and, throughout his life, he presented his scientific work to the Royal Society. Eighteen papers were published in the *Philosophical Transactions* between 1750 and 1788 (Coulomb read 32 memoirs to the *Académie/Institut* between 1773 and 1806). In his papers, Smeaton was concerned with three main topics: instruments, astronomy and mechanics. He was interested in problems concerned with navigation on the one hand, and with astronomical observation and instrumentation on the other, and his papers on these subjects, early and late in his career, were careful and intricate. Between these publications, however, three papers are of a different class; they deal, in essence, with fundamental questions of theoretical mechanics.

It was the great paper of 1759 (soon to be translated and published in France), "An experimental enquiry concerning the natural powers of water and wind to turn mills", that was rewarded with the Copley Medal, the highest award bestowed by the Royal Society for original research – Smeaton was then aged 35. Coulomb's work had been in solid mechanics; Smeaton was dealing with fluids, and once again the basic science had not been established which could be used for engineering design. Smeaton knew of existing French theory and his own experiments demonstrated clearly where this was incorrect. In fact his own theoretical enquiries at this time did not resolve some of the basic issues, and it was Borda in France, 10 years later, who contributed the mathematics which led finally to the turbine. What was hazy in 1759 were the concepts of momentum, energy and work, and how these should be expressed mathematically; Smeaton got far enough in his analyses to be able to make correct design decisions for mills.

In all of this scientific work are reflected the difficulties that confront an engineer when he expands a basic store of science, great though that may be, to tackle problems not met with before. Smeaton's eighteen papers are valuable in themselves, and they show how he was contributing to his profession, establishing ideas which could be understood, taught and used by his successors. But the papers are in effect by-products of the design and execution of a great range of civil engineering works.

Perhaps the best known of Smeaton's works is his first lighthouse of 1756/9, the Eddystone. His own *Narrative of the Building and a Description of the Construction of the Edystone Lighthouse*, published as a book in 1791, shows how an engineer achieves something new. The Trustees had to agree to a house built in stone; Smeaton himself went to Plymouth to survey the Rock (he invented his own surveying apparatus for this purpose); he devised an ingenious interlocking of each course of stone to confer stability on the whole structure; he made experiments, and finally determined the precise mix of lime and pozzolana to form a mortar that would set under sea water; and he considered the effects of wind and waves in his choice of a continuous-

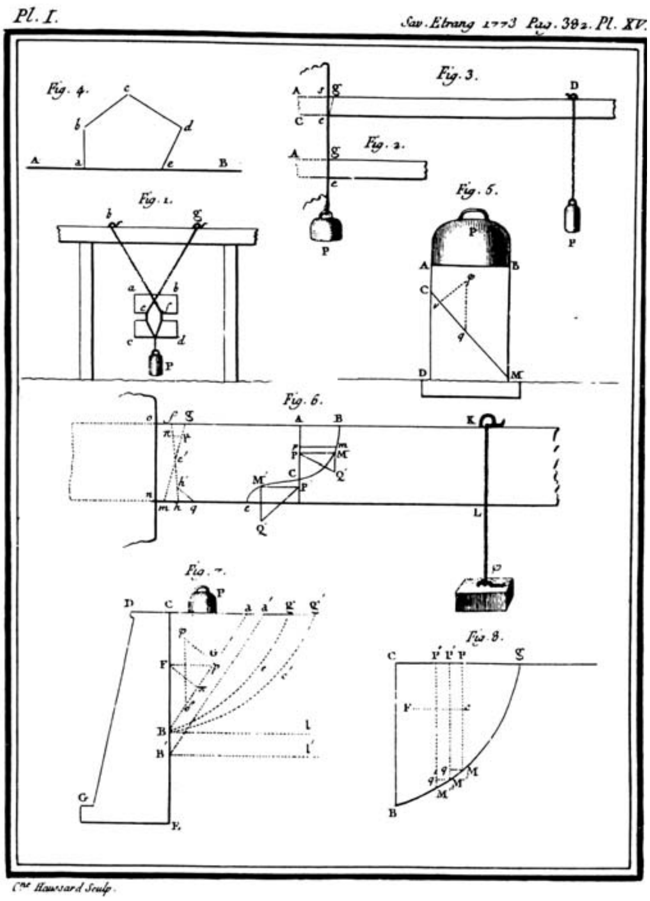


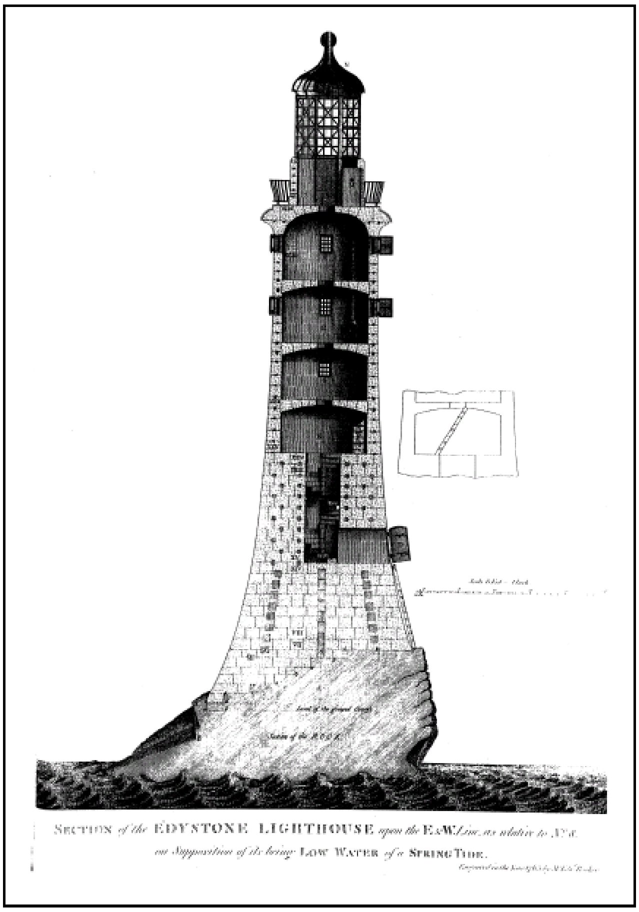
Plate I of Charles Coulomb's first scientific paper, presented to the French Academy in 1773 and published in 1776. The plate illustrates three of the four problems discussed by Coulomb - illustrations of masonry arches were grouped on a second sheet.

Figure 3 shows a beam, embedded in a wall at the left-hand end, and carrying a load near its tip - how could the breaking load of this cantilever beam be calculated? A tension test, shown in Fig. 1, would give the fracture strength of the material - could this fracture strength be correlated with the bending strength of the beam? Coulomb showed how such a prediction must be made, and Fig. 6 gives the technical illustration from which he developed his theory.

Similarly, Coulomb was concerned with the calculation of the breaking load of a stone column loaded vertically, as in Fig. 5, and he showed that fracture would occur along an inclined plane CM, at an angle which could be predicted from the properties of the material.

The third problem tackled by Coulomb was the design of retaining walls to hold back soil (Fig. 7). To design the wall, it was necessary to evaluate the thrust of the soil, and Coulomb's 1773 paper is regarded as fundamental to the development of the science of soil mechanics.

These four problems - the strength of beams, the strength of columns, and the thrust of soil, together with the thrust of arches - were the most important problems of civil engineering in the eighteenth century. They arose in a military context, in the design of fortifications, but their solutions opened up a range of applications in the general field of structural engineering.



Eddystone lighthouse: An engraving from a drawing by Smeaton.

The Eddystone Rocks are part of a reef of red granite, 14 miles south of Plymouth; they are largely covered at high tide, and have always been a hazard to shipping. A first lighthouse was built on the rocks in 1696, and was destroyed in a storm in 1703. A second lighthouse, in timber, was completed in 1709, and survived until 1755 when it was destroyed by fire. Smeaton was relatively unknown when, at the age of 31, he was commissioned to design a new lighthouse, and he was determined to use stone, both for its weight which would resist the forces of wind and sea, and because it would not burn.

The first problem Smeaton faced was to anchor the stones securely to the rock base. Six steps were cut in this rock, and the steps filled with massive blocks, weighing between 1 and 2 tons, dovetailed together and to the rock. The seventh course was the first complete course of the lighthouse; the exposed blocks were of granite, and the inner of Portland stone. Entrance to the house was above level 14, and a spiral stair led to the succession of four chambers above level 24; these living quarters were enclosed by a circular wall consisting of single blocks of granite. Access between chambers was by means of a movable ladder.

The lighthouse was commissioned in 1759, and survived for well over a century - it was then found that the base rock was in a serious condition. Smeaton's tower itself was in good condition, and the upper parts were taken down and rebuilt on Plymouth Hoe, after a replacement tower had been completed in 1882.

ly curved profile for the lighthouse. Finally, he made sure that the work was prosecuted well and efficiently – engineers' tasks do not stop with the conceptual ideas, nor yet when those ideas have been clothed with design calculations and drawings; engineers must ensure that the projects are actually achieved.

For the twenty-five years following the completion of the Eddystone lighthouse, that is, from 1760 to 1783, Smeaton was intensely occupied with engineering projects. He designed more than 50 watermills and windmills, and some dozen steam engines for water supply and pumping. These are what would now be called mechanical engineering works, and of course gave rise to those questions of momentum and power to which he tried to find answers. In the civil engineering field, Smeaton designed four major public bridges, including the three fine masonry arches at Coldstream, Perth and Banff; there were also half a dozen minor bridges in stone or brick, and two aqueducts. He was responsible for the Forth and Clyde Canal, and for substantial improvements to several river navigations; and his works include major harbours, piers and fen drainage schemes. Before 1760 the profession of civil engineering hardly existed; a decade later recognisably modern consulting engineers could be seen, of whom Smeaton was preeminent. Such men, then as now, travelled to where their skills were needed; they made designs on the basis of their store of knowledge, and, if that store were insufficient, they made their own theory and experiments and contributed to the science of their subject; and they made sure, if necessary with assistants, that the work was properly done.

Engineers cannot work alone. Mention has been made of the Institution of Civil Engineers which in 1828 formally established a channel for the exchange of professional information. Much earlier, in 1771, an informal Society of Civil Engineers had been established; Smeaton was a founder member, and he was a regular attender of meetings until his death, when the group was renamed the Smeatonian Society. It was in essence an eighteenth-century dining club, and as such it still exists today. There was, however, a vital function - the club provided the opportunity for a group of civil (that is, non-military) engineers to discuss their work.

(Jacques Heyman - University of Cambridge "THE SCIENCE OF STRUCTURAL ENGINEERING", Chapter 1, pp. 1-8, © Imperial College Press,
http://www.worldscibooks.com/engineering/p163.html)

Civil/Geotechnical Engineering in Society: Philosophical Thoughts, Challenges and Recommendations

Heinz Brandl (*)

ABSTRACT

This contribution is dedicated to the public image of the civil engineer and geotechnical engineer, respectively, seen from an ethical and philosophical point of view. Discrepancies between professional opinions, the gap between theory and practice, pros and cons of codes or regulations, and the lifelong learning society are discussed on the basis of the author's nearly fifty years of comprehensive professional experience. Furthermore, the environmental challenge to civil/geotechnical engineering due to climate change and global increase in population is emphasized. Finally, the younger engineering generation's prospects in the future are addressed and recommendations are given.

1. Public opinion

We live in the age of high tech. Though engineering stands at centre stage becoming the key to survival, civil engineering is a much misunderstood and widely underestimated profession (Fig. 1). It is a melancholy paradox: in its moment of ascendance and severely needed by society, civil engineering is frequently faced with the trivialization of its purpose and the debasement of its practice.

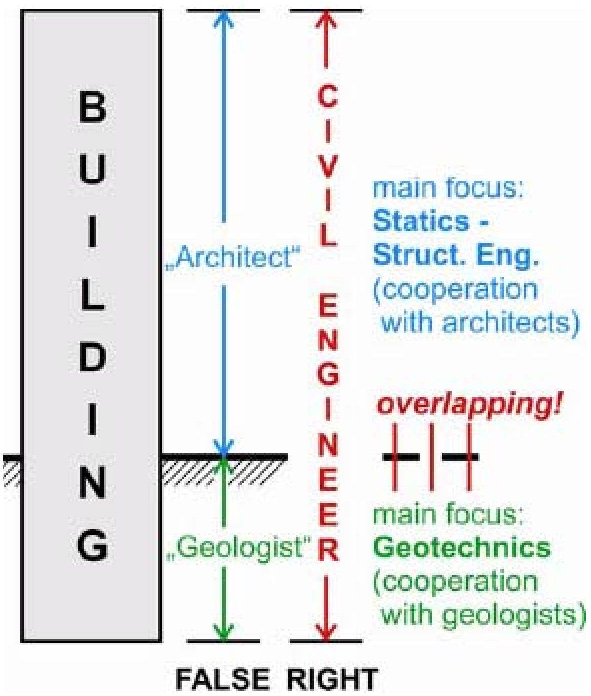


Fig. 1. Where is Civil Engineering? Hidden between architects and geologists? Overlapping interaction and cooperation are essential.

In the social system of ancient Egypt, civil engineers (especially hydro and structural engineers) ranked directly below the viziers (and the God-King), and were thus in a position equal to governors of the provinces. Architects, painters and artists were subordinate to them (Fig. 2). But these times are long gone.

Most individuals, living in a modern industrial state, are not aware how much it is the achievement of civil engineering that so many people can live comfortable lives in such relatively small areas. For the basic needs of society, civil engineers build water supply and sewage facilities, they construct apartment and office buildings, factories, as well as storage facilities and silos. For the distribution of goods they build roads and railways, waterways, market halls, department stores and supermarkets. For the education of children they construct all kinds of schools, and, to an ever increasing extent, trade schools, colleges and universities for the professional education and training, because more and more people strive for higher education to enrich their lives. Civil engineers erect (drinking) water supply systems, irrigation systems and the facilities to obtain natural resources, they build power plants for energy generation, hospitals where people hope to be cured, sport facilities for bodily fitness - as well as sewage removal systems, waste water purification plants and refuse deposits in order for society not to be suffocated by the waste created by Industrial production and by every-day-living, and in order to prevent irreparable damage to the environment. Furthermore, civil- and geotechnical engineers minimize natural hazards (e.g. by landslide stabilization, flood protection, avalanche and mudflow protection, design of earthquake resistant structures, etc.).

Fig. 2. In the social system of ancient Egypt civil engineers (hydro engineers) ranked directly below the viziers (and the God King) in a position equal to governors of provinces.

Very few people recognize that it was primarily civil/geotechnical engineering that made it possible that the average life expectancy of men in the industrialized countries increased so dramatically during the past 100 to 125 years: In former centuries drinking water was often contaminated and full of bacteria. This foul water and the improper removal of waste caused terrible epidemics (e.g. cholera, typhoid fever, dysentery), which killed millions of people in Europe alone. From this point of view, it is the merit of civil/geotechnical engineering to have saved more lives than medicine by providing the means for clean drinking water supply and for the proper disposal of liquid and solid waste (Fig. 3). The first public Vienna drinking water system, for instance, was constructed in the years 1870-1873, and it has been supplying the population with 470 million litres of high quality water per day ever since. The total length of the pipes from the headwaters region in the mountains to the reservoirs in Vienna is 3,100 km.

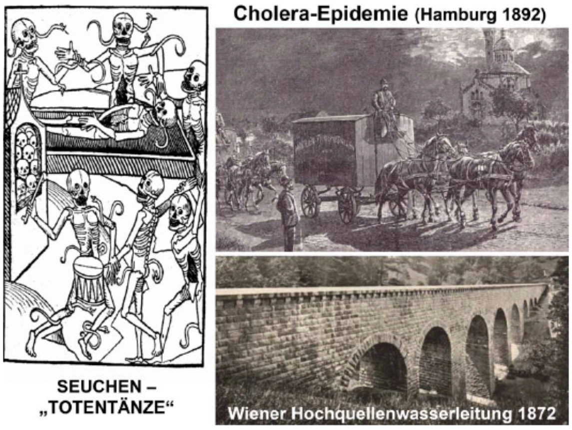


Fig. 3. Contribution of civil engineering / geotechnical engineering to increase human life expectancy through clean drinking water. Contrary to Hamburg its twin city part Altona had in 1892 already a modern drinking water supply and, therefore, remained free from the Cholera epidemic. Vienna had this already in 1872 (right, below)

Most people understand construction as constructing houses or buildings. This misconception had made civil engineering a very small term in public opinion. But actually, construction is one of the biggest industries worldwide, in India for instance even number two behind agriculture. And it is far beyond the film industry, which takes at least one full page in every newspaper describing its legends every day.

It was through dams, not gold that California became the equivalent of the world's seventh richest country: Dams have turned the arid Central Valley into an agricultural supermarket to the world. Dams quench the thirst of coastal cities from San Diego to San Francisco with billions of gallons of fresh water annually. Dams let Sacramento escape regular devastating floods. And above all, dams power the states aerospace, microchip, film or "dotcom" industries with an average 40 BMWh of electricity: more than coal, oil, geothermal waste, wind and solar energy sources combined (Asmal 2000).

The main reason for this discrepancy with regard to our profession is that most achievements are taken for granted. They simply work, and civil or geotechnical engineers are not spectacular enough for the media. Attention is paid more or less only in the case of failures or building collapse, according to the media's principle "only bad news is good news".

On the other hand it is our fault that the public is not informed about outstanding achievements of our profession, e.g. construction of 10-lane underground expressways in urban areas and soft soil, structures in sliding slopes and earthquake zones, etc.: Engineers do not talk very much about the work that they have done, and they are rather reserved towards media people.

It is hardly known that the first fully-working, program-controlled, electromechanical digital computer in the world (already with 2000 relais) was invented in 1941 by a civil engineer (the German K. Zuse, 1910-1995), who in 1955 also invented the first electronic device to rationalize and accelerate the many comprehensive calculations he had to perform in structural and geotechnical engineering.

The Scottish bacteriologist Sir Alexander Fleming (1881-1955), for instance, is well known worldwide (Nobel Prize for development of penicillin), but only few persons have heard about the Canadian civil engineer Sir Sanford Fleming (1827-1915) who coordinated the development of railways, telegraph, and standard time zones.

The American civil engineer (and medical doctor) Andrew Taylor Still (1828-1917) founded the osteopathy, an alternative medical treatment using only the hands.

The German civil engineer Johann Tschauner (1908-1974) became a pioneer of rocket and space technology and astrodynamics.

Also very few people know how much civil engineering contributes to modern medicine: Hydraulics is not only used in waterpower technology and for designing drinking water supply systems and sewage systems but increasingly also for the calculation/assessment of the streaming behavior in blood vessels (especially in the vicinity of bypasses). Statics contributes significantly to the medical understanding of stress-strain behavior of the human (or animal) skeleton and muscle system - thus becoming an important factor for difficult operations, rehabilitation, for prostheses, etc. Screws made of bone material are used in the oral and maxillo-facial surgery. Statics and strength of material sciences are even helpful in dermatology: For example, taking into account the major and minor principal stress directions of a local skin area during skin operations helps to minimize scar formation later. The special course "Biomedical Engineering" at the Vienna University of Technology underlines this cooperation between civil engineering and medicine.

The main task of the building industry (including geotechnical and environmental engineering) is not only the construction of new structures, but also the maintenance, and finally the repair of those old damages, which have been caused within the last decades by our industrial "squandering society" - partly through ignorance and partly through lack of knowledge.

For nearly a century the "men of technology" had been considered the personification of progress. The historian Thomas Buckle, for instance, wrote with enthusiasm: *"The railway did more to bring people together, than all philosophers, poets and prophets before".* This glorification of technology has now, in many cases, turned into just the opposite, sometimes even to a "Techno-phobia". The present doubts and uncertainties are expressed by Peter Ustinov: *"The last voice to be heard before the globe exploded was that of an expert saying that this would be technologically impossible."*

Anti-technology fanatics and unrealistic environmentalists have now even created the rude term "techno-fascism" which comprises the whole field of technics. But they forget that modern life depends entirely on technology, and this will increase more and more as time goes on. Technology critics would, no doubt, ask for remote surgery if this advanced technique could save their lives. And most of those who condemn modern production nevertheless are consumers of those products.

From the "warm bed" of an affluent, industrialized society it is relatively simple now to globally criticize the enormous achievements of technology, which would not even have been possible in dreams 100 years ago. This criticism is not voiced by the generally practical and realistic silent majority, but by some thoughtless or even untrustworthy media people, opportunistic politicians, narrow-minded idealists who do not understand the paramount connections, and finally by dreamers, pseudo intellectuals, and image neurotics. "Experts" who, more or less, oppose any new project without proposing alternatives are like dentists who bore holes into the teeth but don't fill them.

The civil and geotechnical engineer is, and always has been, primarily an executive organ (but not an executive "slave"). Not he should be criticized but those clients, official or private, who wanted to have a certain project realized. Until a few years ago, almost every mayor of a city or a village fought like a lion to have as many broad streets built as possible, because that was considered modern and a sign of progress. Now, the same individuals complain of the disadvantages of increasing traffic. Can this development be blamed on the civil engineer? Definitely not!

We run risks. Most of the time we ignore them; sometimes we stop and decide how to deal with them. That's life. Risks arise in sports, in business, in personal relationships; they are present in the laboratory, in technology, in medicine, on construction sites, in traffic, in political calculations, everywhere (Fig. 4). Acting individually, we often prefer to gain some benefit by accepting some danger. Acting collectively, we make similar trade-offs (Nicholas, 2000).

Fig. 4. Ship impact at a main pier of a railway bridge crossing the river Danube. Toe zone of the pier sheared off by 2.2 m; steel girders show multiple buckling.

When society must assess risks, and those risks can be clarified, at least in part, by science, technology or mathematics, the responsibility of the research community seems to be "clear and complete". But that is not always so easy.

People frequently expect a so-called zero-risk or at least that today's risks must be manageable. The first demand is absolutely unrealistic; the second one can only be partly achieved. Risk level, risk assessment and risk management depend on numerous interacting factors and on the specific fields, as medicine, transportation engineering, mechanical engineering, civil engineering, etc.

Civil engineering, especially geotechnical engineering, involves higher professional risks than most of the other technical fields. Calculated risk and residual risk have to be well balanced, whereby a central question remains: "How safe is safe enough?" Failures can occur in spite of detailed ground investigation, sophisticated calculation, site supervision and monitoring - they are inevitable because of the complex nature of ground and groundwater. Nevertheless, the public opinion is very critical towards this branch of engineering, and "building scandal" or "construction scandal" is a term easily used by the mass media for headlines. Moreover, engineers, as viewed by the public, should exclude every risk (even if unidentifiable). On the other hand, the public has more or less got used to traffic accidents killing thousands of people per month worldwide. There is a great difference in the evaluation of car accidents on the one hand and other accidents on the other. The car has obviously become today's "idol" or "golden calf" which consequently involves the public acceptance of high risks to life and health, while accidents e.g. caused by a failure in the road structure, by uneven pavement on expressways, or by a bridge collapse (e.g. due to scouring) are condemned as almost criminal acts.

Consequently, it should be emphasized that a so-called 100%-safety cannot be obtained in many cases of geotechnical engineering (e.g. landslides, earthquakes). And this must be accepted by

- the public,
- politicians and other decision makers,
- and by lawyers.

Several clients and politicians have been quoted as saying that they would like some day to meet an engineering geologist or geotechnical engineer who is one-armed - so that he will not be able to say "on the other hand". This rather feeble witticism reflects on all too prevalent impatience with uncertainty. We crave for clear answers, but ground is an uncertain material. Hence, it is one of the greatest challenges in geotechnics to come up with a design or an answer when no clear-cut, ideal solution exists.

Geotechnical engineering achievements or scientific work cannot be evaluated by prizes as in case of architectural competitions. Though originally very laudable and productive, the rating business has been in many cases taken to ludicrous extremes (e.g. "best" dentist or pizza parlor of the town). It may be explained by the US syndrome for ratings and rankings, which results from the super-competitive urges of its population. *But what shall all this rating/ranking accomplish in geotechnical engineering? An objective evaluation is practically impossible and makes no sense. So please, let us stay away from producing rankings* (Dunnicliff 2000).

It seems, that even normal ranking alone is not sufficient any more. The term "excellence" has become increasingly over-stressed and overused. Institutions, universities, companies, etc. all are offering special fields of "excellence", and the peak is the Nobel Prize. However, for engineering sciences (as well as for architects) no Nobel Prize exists, thoughpersons like Karl Terzaghi or Nikolaus Tesla certainly would have deserved this outstanding award (Fig. 5).

Fig. 5. There is no Nobel Prize for Engineering Sciences.

Despite all efforts to improve the image of the civil engineer, it will always be below that of the colleagues of medicine, physics, or chemistry - because high-tech surgery, for instance, directly saves lives, and flights to the moon are just more spectacular than even the most impressive structures. Especially disadvantaged in this respect are we, the geotechnical engineers. It is said that surgeons cover up their mistakes by burying them; in our work the successes are buried and hidden below the ground surface, upon which the architects put their "visible" structures and are praised for them. Our names are only mentioned if something goes wrong. This should not frustrate us too much, *because geotechnical engineers work with the contents and not with the image*.

Coming back to the comparison geotechnical/civil engineering and medicine (Fig. 6): Recent medical statistics disclosed that in Great Britain about 40.000 people annually lose their life because of medical mistakes. The same number is known from Italian hospitals, whereby organizing problems and defect equipment, and less medical mistakes play a role. In Germany, about 25.000 patients die because of wrong treatment or unsuccessful surgery. In addition, about 300.000 patients survive but suffer permanently from severe treatment mistakes. Imagine, if geotechnical engineers designed and constructed in such a way that, let's say, 10 people annually would lose their life in each of these or other industrialized countries. The public would rip them apart. Nevertheless, the doctors still remain the Gods in white, while the engineers are frequently looked down upon as technocrats. But antitechnology fanatics forget that modern life depends entirely on technology, and this will increase more and more as time goes on.

Fig. 6. Medicine and (geotechnical) engineering: Similarities (Observational Method), cooperation (e.g. statics) and differences (number of "failures"; image in the public opinion).

New technological approaches to sustainable global development are required - not just better policies. Technology is the most promising way out of a lot of seemingly irreconcilable goals associated with bringing the world's impoverished regions into a certain economic boom. But until now global development efforts have been hampered by the failure to mobilize science and technology adequately. In this connection geotechnical and civil engineering could contribute essentially (e.g. infrastructure, irrigation, clean and renewable energy supply, urban ecology, resources and waste management, disaster mitigation).

The challenge for all of us is to demonstrate that, as civil engineers, we can improve the quality of life in an equitable and lasting way.

2. Discrepancies between professional opinions

A close co-operation of experts of various disciplines is wanted and definitely necessary (e.g. geology, geotechnics, structural engineering, hydraulics, physics, chemistry, etc.). But it becomes ethically questionable when some specialists let themselves drift into fields of expertise other than their own, and when they think they would be qualified to act as commentators or even experts, despite their lack of specific knowledge. The grey zone of "half knowledge" of so-called experts is frequently rather wide - and, unfortunately, people mostly tend to believe the wrong half (Fig. 7). In addition, more and more self-appointed "experts" appear on the scene, most of them contributing to the undermining of the decision makers' judgment, sometimes even leading to their total confusion. Experts who are under the pressure of one of the parties in a hearing, or who are otherwise subjected to directives, have to be considered biased. There is also a certain obsession for image building or the striving for the receipt of contracts and jobs, which sometimes influence expert opinions in a questionable way. Whoever has observed the performance of such experts in meetings or hearings will be able to understand the reactions of distrustful or confused politicians - especially in environmental and transportation engineering and in urban design. Sometimes it is not clear *"if such experts help to solve a problem or if they are themselves the problem"*.

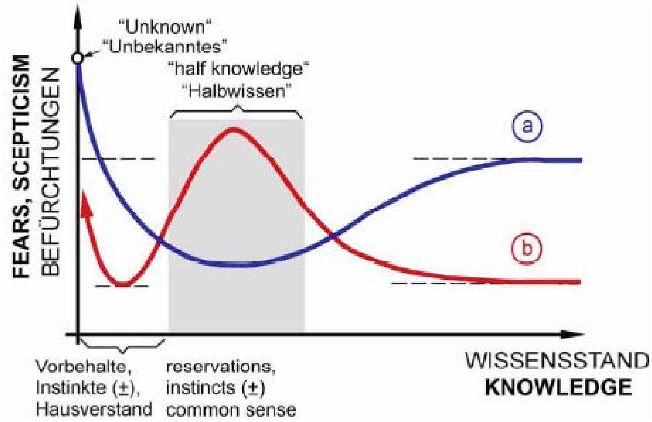


Fig. 7. Fears, scepticism, etc. of people versus their volume of knowledge and the grey zone of "half knowledge" (schematic):
Curve a = usual case. Curve b = special case regarding design and public acceptance of waste deposits or waste treatment facilities and of large scale projects (highways, power plants, high voltage lines, etc.).

Many experts believe in the philosophy of *"he who pays the piper calls the tune"*. This attitude - which can be found in almost any field - might bring short-term success, but in the long run it represents a dangerous boomerang: Both parties lose credibility. Experts who knowingly write tendentious reports in the interest of their client are not legally liable (as long as no criminal offence exists). They can be compared to lawyers who primarily have their client's interest in mind. The lawyer defends his client by over-stressing the positive aspects and omitting the negative ones. In contrary, an engineer must take an equal account of both sides, otherwise he will be considered as a "one-sided, tendentious expert" and lose professional reputation. To sum up, the engineer has definitely to look for the truth, which is not necessarily the duty of the lawyer.

It can certainly happen within the realm of the sciences that experts of unquestionable integrity are of different opinion on special points. Diversity of opinion of experts is hardly new - on the contrary, such discrepancies have always been a spark for further development and often have bred innovation. They should therefore not necessarily be regarded as negative. But there obviously is cause for concern if the public believes that for each expert opinion there might exist (or be ordered) a contradictory opinion by another expert. Typical examples throughout the industrialized world are environmental impact assessments or the site evaluation and selection for a new waste disposal facility.

Experience tells us that the largest source of claims and disputes in the civil engineering field is in the ground. Nevertheless, an alarmingly large percentage of ground engineering is done by non-geotechnical engineers or by geologists with insufficient civil engineering background.

What is very often not realized is that - as in most other aspects of life - there exists a difference in the quality of professional opinions and qualifications. Equal (professional) levels - in a democratic or legal sense - can hardly be found in the case of totally contradictory statements. Actually, experience has shown that highly qualified experts usually arrive at rather similar opinions - or they are at least able to agree on a joint declaration. Huge discrepancies are nearly always based on big differences in the qualification of the experts. Friedrich Engels stated already in 1878 "*There is just no democratic forum for scientific work*".

Especially dangerous are those "experts" who don't know what they don't know. Incompetent persons are sometimes like noisy sparrows: they appear in swarms and drive away the song-birds.

The decision makers, especially the politicians, thus have to have the courage to stand by the opinions of high-level professional experts - and should ignore possible "counter-opinions" from biased, image-neurotic, or self-appointed experts. Here, the interest of the community has to be put before the egoistic interests of individuals.

"Experts" or groups hindering or even preventing the construction of buildings, which are required for the infrastructure of modern society (e.g. highways, railways, power plants, waste disposal facilities) should be called to account for their egoistic or fundamental, or even anarchistic activities. Most of the time such people only discuss what is not possible, not justifiable, not allowable, not appropriate, not functional, etc. Positive, constructive suggestions and the (co-operative) search for feasible, realistic solutions are pushed into the background. This can result in a feeling of uncertainty on the part of the politicians, can diminish their ability to make decisions and sometimes even lead to their total resignation.

The expert, for his part, will have to get used to accept and allow doubts that are expressed with regard to his qualification, his professional knowledge and the correctness of his opinion, and not consider them as lèse majesté. Distrust about the expert's objectivity should be accepted by him with philosophical calmness.

Moreover, the expert increasingly needs inexhaustible patience, for instance with those neighbors of construction projects who lose all objectivity purely because of their contradictory standpoint and personal interest. A typical example is the "not-in-my-backyard" syndrome which can be found so often in the siting of new waste management facilities (landfills, incineration plants). All too often, the issues opposing such siting are non-technical, e.g. they are political, social, conceptual, emotional, etc. When considering a new or virgin site (also called "greenfield" site), the situation is heightened to the point where technical logic is often completely left out of the decision making process. Moreover, there is a wide emotional discrepancy in the public tolerance regarding contamination by public traffic or landfills (Fig. 8). Only few persons would abstain from driving a car.

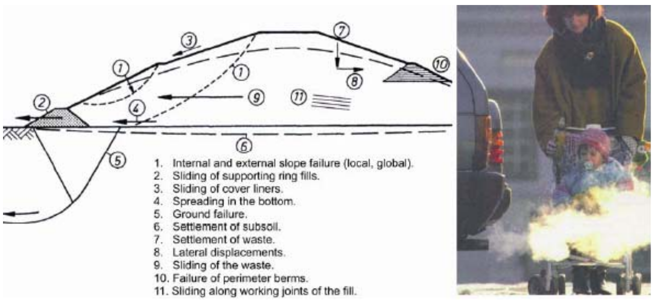


Fig. 8. Example from environmental geotechnics: Prove of ultimate limit states and serviceability for municipal waste deposits. Widely different contradictory tolerance regarding contamination through landfills or public traffic.

To sum up, that type of expert is needed "*who gains his self-confidence and his authority from the quality of his expert opinion and not merely from his function and position*".

3. Theory and practice; codes and standards

In the last decades the level of geotechnics has increased tremendously, especially in ground engineering but also regarding numerical methods. However, the latter includes - to a certain extent - some danger to younger colleagues if they are not led properly: They frequently think that everything can be calculated, even to an accuracy of several decimal places. More and more, a so-called "point-and-click generation" of "white collar engineers" without sufficient site experience is emerging.

The world is becoming digital, whether we like it or not. We may soon arrive at the stage where nothing can be designed or evaluated unless it can be done numerically. Nevertheless, engineering judgment will remain essential in the whole field of civil engineering, especially in geotechnics. But engineering judgment can be gained only by combining theory and practice. An excellent geotechnical (and structural) engineer requires not only a firm theoretical knowledge but also comprehensive experience, as well as engineering feeling and intuition in equal parts.

Fig. 9 shows an example where over-reliance on new numerical methods and lacking parametric studies in the design phase caused severe problems during the operation of a 200 m high arched concrete dam. Finally, a 60 m high counterweight was required to enable a full reservoir filling (Brandl, 1990). Counterweight and arch dam are connected by more than 600 horizontal bearings for regulating the seasonal movements.

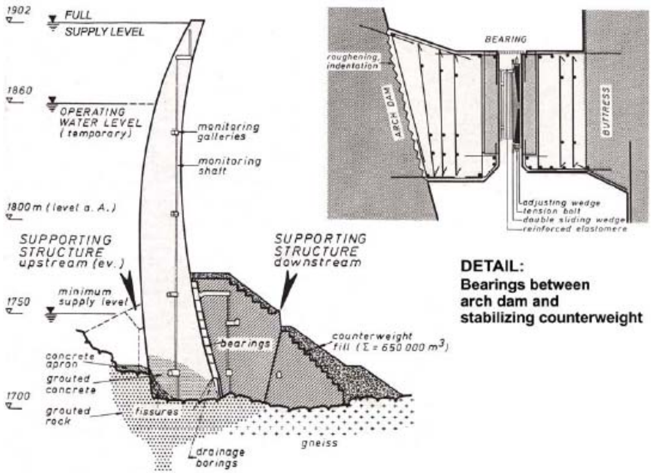


Fig. 9. Comprehensive rehabilitation of a 200 m high arched concrete dam. Severe operation problems because of over-reliance on new numerical methods in the design phase.

The role of experience in geotechnics had already been emphasized by Professor Karl Terzaghi towards the end of his life when he wrote: "*There was only one temporary deviation of the professional line I pursued. It involved a brief period in the twenties during which I believed that the problems of earthwork and tunnel engineering like those of bridge design could be solved by theory alone, on the basis of the results of adequate laboratory tests.*"

With regard to publications and lectures, another statement of K. Terzaghi, included in the foreword of the first issue of Geotechnique (1948), is still valid*: "A well documented case history should be given as much weight as ten ingenious theories."* This recommendation could help to bridge the gap between theory and practice.

Terzaghi's close colleague, Ralph B. Peck predicted in 1991 the consequences of a gradual widening of the gap between theory and practice as follows: *"Researchers will take refuge in increasingly esoteric investigations; practitioners will* *pay little attention to the research results. Reading learned journals will become less interesting and profitable to practitioners, scientific oriented workers will find themselves more or less writing to each other."*

To be experienced does not necessarily mean to be knowledgeable. And pure practitioners ("we have always done so and don't need any theory or science") are just as onesided as pure theoreticians. A cross fertilization between theory and practice is needed, as has been successfully demonstrated by bringing modern geotechnics to practical tunneling and vice versa during the past decade.

My own professional activity of more than 40 years has confirmed again and again: *"The deeper you penetrate into your profession, and the more difficult a project is, the more experience counts, but combined with theoretical knowledge."* A design, which is exclusively theoretical may lead to results, which are widely contradictory to practice. Two spectacular examples of then innovative technologies which were widely criticized in the first stages of their application may illustrate this: The deep dynamic consolidation (heavy tamping, Fig.10) of soft clays seemed to be completely contradictory to the conventional consolidation theory and soil improvement technology of that time (1970 – 1975). Crib walls and slender geosynthetic retaining walls were also questioned until the observational method proved their suitability. The safety of these structures up to 20 - 30 m height and installed in steep slopes could not be proved in a theoretical, conventional way. Hitherto calculation methods had provided safety factors clearly below 1 (sometimes F = 0.7), whereas the structures - constructed with engineering feeling, empiricism and experience - showed sufficiently safe behavior, as monitoring disclosed (Fig. 11). Meanwhile structures up to 40 m height exist.

Fig. 10. Heavy tamping in deep reaching, extremely soft organic soil in 1972 (left). Different cranes on later construction sites.

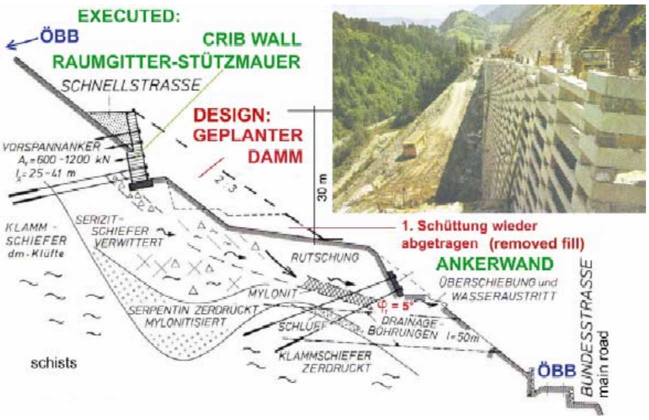


Fig. 11. Crib walls in unstable slopes, locally tied back with prestressed anchors – up to ca. 40 m height. Example for an emergency re-design of an embankment to a tied back crib wall in the early construction phase when already the first small fill caused slope movements that threatened the railway lines (ÖBB) downhill and uphill. Locally only φ_r = 5° in mylonites.

Such discrepancies or contradictions occur not only in geotechnical or structural engineering but also in other disciplines of science as an example from aerodynamics illustrates: *"Theoretical investigations have proved that the bumblebee, because of its bodily form, its heavy weight, and its relatively small wing area cannot fly. Thank God, it does not know this, and so it keeps buzzing happily through the air!"*

Those who think that engineering problems can be solved by theory alone should be reminded of Leonardo da Vinci: *"It has been said that the knowledge acquired from experience is purely mechanical, while scientific knowledge always begins and ends in the mind. But it seems to me that those sciences which have not been born by experience, the mother of all certitude, are vain and full of misconceptions."* – See also Fig. 14.

J.W. Goethe also addressed this subject when his Mephisto in Faust II states (Fig. 12): *"They think, what cannot be calculated cannot be true"* and *"Das ist eine von den alten Sünden, sie meinen Rechnen, das sei Erfinden"* - meaning *"This is one of the old sins, they think calculating be inventing."*

Fig. 12. J.W. Goethe's Mephisto in Faust II refers to the discussion "pure mathematics" – "inventor mind", Right: Two figures to "Faust", drawn by J.W. Goethe: Witches (top), Walpurgis night (below). "They think, what cannot be calculated cannot be true". "This is one of the old sins, they think calculating be inventing".

In the 1930ies, when the young science of soil mechanics was severely questioned and even opposed by many academics (Fig. 13), K. Terzaghi stated: "*The present opponents of soil mechanics will die out; so this problem will solve itself biologically. But the worst harm to soil mechanics will come once it is discovered by pure theoreticians because the efforts of such men could undermine its very purpose, especially if they don't distinguish between idealization and reality."*

A. Einstein obviously had a similar opinion of pure theoreticians when he stated: "*Since pure mathematicians have fallen upon the relativity theory, I myself don't under-stand it any more."*

With regard to the ever increasing capacity of modern computers and numerical methods, it should be emphasized that soil is a physical model, a particulate material and not a virtual model.

In his Nash lecture J.B. Burland stated 1987: *"It is both arrogant and dangerous to believe that ground engineering can be carried out solely on the basis of numbers given from site investigation coupled with codes of practice. It is* *necessary to study case histories, learn about local experience, examine the soil and visit the site."*

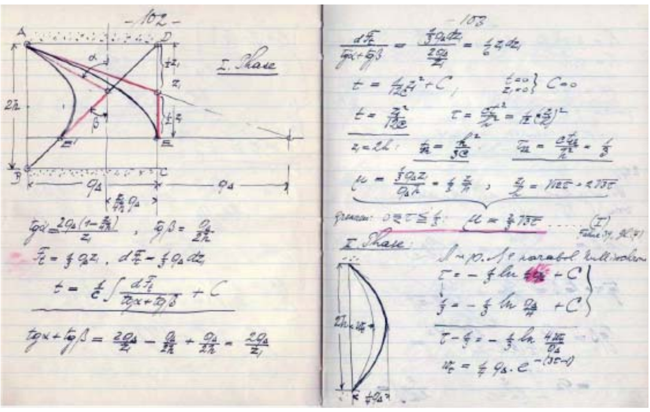


Fig. 13. From the notebook of O.K. Fröhlich (December 1935): Theory of settlement of clays (together with K. Terzaghi). Severely opposed by P. Fillunger (TU Vienna), who stated in a polemic e.g. "wherever one opens books on soil mechanics, one finds curiosities" (Brandl, 1983).

A field where theory and practice inevitably collide is the remediation of contaminated sites if pure theoreticians, idealistic environmentalists or formalists require an "absolute" cleaning. But this is in a strict physical/chemical sense practically not possible. Cost-effective measures achieve an effectiveness of about 70 to 80(90)%. Cleaning of more than 90(95)% commonly leads to an excessive increase of costs. From a pragmatic point of view, it therefore should be preferred to remediate more sites on a lower level than to spend the available money on just one site - whereby the question "how clean is clean" still remains.

In conclusion, geotechnical engineers must go on bridging the gap between theory and practice. A simple example from the field of deep foundations shall underline this: Theorists have been thwarted by the complexity of the boundary conditions during pile installation and the limitations of existing soil models; experimentalists have been handicapped by the number of independent variables needing measurement. As a result, pile design still relies on empirical correlations between a limited set of parameters, while other (equally important) factors are neglected.

A lack of practical experience can be observed among many academic staff. A detrimental effect of research evaluation in universities has been to create "paper-writing machines" (Langdon 2002) who have no practical experience. On the other hand, a lack of mathematics and science in the university education is also to blame. For instance, how many geotechnical engineers question the certainty of their (semi-) empirical design correlations (and how many would even be able to do so?). Consequently, teaching of theory and practice must be well balanced. Otherwise the systems leads to graduates who will be increasingly unlikely to have heard about an alternative to the textbook solution.

Engineering is the application of science to technological problems. But it is not simply the gross application of sublime theory; it is also a versatile scientific field per se. Nevertheless, a non-negligible group of architects and even civil engineers frequently looks the other way. Of course, the usefulness of new theories has not been always immediately apparent, but the incorporation of science into engineering was eventually extremely successful. *"There is nothing more practicable than a good theory!"* (I. Kant, 1724-1804) – Fig.14.

With this opinion, the greatest German philosopher was far ahead of his contemporaries. For instance, in 1822 Thomas Tredgold, a celebrated British engineer observed that *"the stability of a building is inversely proportional to the science of the builder"* (Florman 1987). When in 1858, W.J.M. Rankine issued his famous and widely used *Manual of Applied Mechanics*, he sought to put an end to the deplorable "separation of theoretical and practical knowledge." Yet as late as 1872 the author of a *Civil Engineer Pocketbook* stated that he would not refer to Rankine or other exponents of theory because they are "but little more than striking instances of how completely the most simple facts may be buried out of sight under heaps of mathematical rubbish" (Florman 1987).

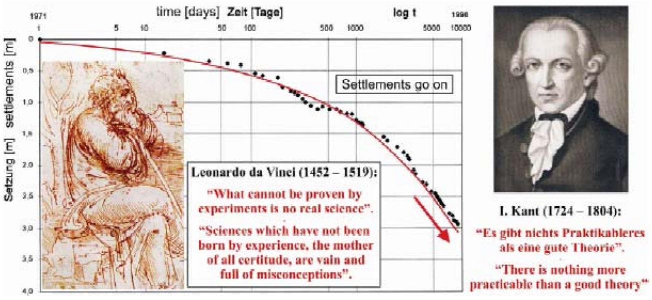


Fig. 14. Left: Airport "Leonardo da Vinci" in Rome. Time-settlement curve (3 m settlement within 30 years) required rehabilitation. Semi-logarithmic curve allows better prognosis than linear plotting. Leonardo da Vinci's opinion on theory – experiment – practice. Right: Immanuel Kant, the great German philosopher.

The basis for an interaction of theory and practice should be laid already during university undergraduate education. Students should be trained to think critically and independently. More thoughtful skepticism should be emphasized instead of concentrating too much on certainties or on details of limited value. Instruction, education and training should be properly balanced in the curricula, and diversity and creative design should be encouraged. Teaching should incorporate the presentation of case histories and precedents.

University education must be more than mere instruction (training) and increasingly becomes only an introduction into a life-long learning process. Continuous education and flexibility (in the positive sense - not opportunism) are becoming more and more important in their relation to the classical studies.

There is a certain tendency - a spirit of the "modern" age to make things as complicated as possible. This refers, for instance, to theories, which are not applicable in practice, to oversophisticated quality assurance, etc., but also to some "esoteric" conference papers or oral presentations. Such "development" is certainly neither desirable in practice nor for conferences or for technical journals. It is much more difficult to present really complicated hypotheses, etc. in a clear way than to "complicate" relatively simple methods or theories in an artificial way (being mistakenly of the opinion to thus gain scientific reputation). Hence, one should focus more intensively on the old tradition *"Nothing beats simplicity"* – but avoiding over-simplification.

The philosophy of calibrating simplified calculations against more analytical methods and field data has proved very effective in geotechnical design. Over-sophisticated calculations frequently pretend an accuracy, which in reality does not exist. A typical example are retaining measures in unstable slopes where soil and rock parameters exhibit a wide scatter and pore water pressures represent another uncertainty.

The gradual substitution of global safety factors by several partial safety factors does not conclusively mean that the "real safety" can be assessed now more precisely than before - neither in geotechnical nor in structural engineering.

Accordingly, sophisticated and more or less fully computerized test equipment should be considered a valuable supplement to conventional devices and performances of field and laboratory tests, but it should not replace the tried, "simple" methods. The latter are needed for comparison and for calibration; furthermore, they hardly ever result in hidden mistakes or wrong outprints as automated devices sometimes do.

Young engineers and especially professionals of a low quailfication frequently stick slavishly to codes, standards and guidelines. If a theory finds its way into a textbook, it is considered by many readers a law. Moreover, too many regulations, standards or codes, which are too confining hinder innovation in geotechnical engineering (Fig. 15). They act like a brake, slowing down new development. Furthermore, there is the danger that our professional activities are going to be degraded to a mere fulfilling of regulations. Overspecifications may also have a detrimental impact and pretend that there is no residual risk left. Furthermore, engineers are increasingly afraid to design outside of standards or codes because they fear legal problems in case of a failure. This also has been dramatically reducing the willingness to take responsibility. Fear for liability or litigation is stifling innovation in civil engineering, especially in geotechnics, and pushing engineers towards over-reliance on standards. But over-reliance on standards or codes hampers also engineering judgement and kills "engineering intuition". The tendency to do things as we've always done is another hindrance to innovation and development in construction.

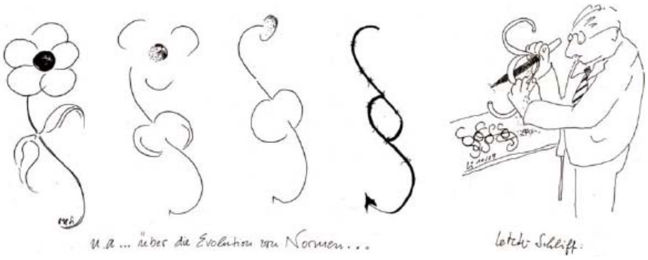


Fig. 15. Too many codes and standards? Over-regulations? From "Apokalypse Bau – Aus dem Tagebuch eines Bauingenieurs" (K. Stiglat). "From the diary of a civil engineer". Left: The evolution of codes. Right: Last polish. "One should not say that we have lost the contact to practice".

Ralph B. Peck complained already in 1980: *"Where has all the judgement gone!"* And it seems, that the situation has even worsened since.

Therefore, personal creativity, interlinked thinking and responsibility should be much more promoted. Otherwise, engineering judgment would deteriorate dramatically – which would be disastrous, especially for the young, upcoming generation of engineers. Consequently, educating young people to be creative problem solvers as 21st century engineers should begin already at the universities and engineering schools.

The fulfilling of standards, codes, regulations, etc. is certainly necessary to a wide extent during the daily professional life. But additionally, young engineers should try to leave the conventional paths as much as possible and intensify creative work - even if it seems sometimes to go against the present state-of-the-art. *"The man with a new idea is a crank, until the idea succeeds"* (Mark Twain, 1835-1919).

A courageous engineer is willing to take a calculated geotechnical risk, which involves detailed ground investigation, parametric studies, geotechnical prognoses, "active" design (i.e. adaptable), proper risk assessment, and monitoring with back analyses. The more prerequisites of such a serious geotechnical risk are missing, the more it approaches a "*Geopoker*" (or "Geo-Gambling"). Geopoker is favored by brutal competition, time pressure, economy and lack of knowledge (thus underestimating risk and danger). Geopoker has led to the paradox that the number of geotechnical failures has continuously increased during the past years (statistically confirmed) - despite the advanced geotechnical education at the universities.

This negative tendency is, additionally, favored by today's fiercely common money saving policy, by increasingly shorter construction periods and by the pressure to construct on/in poorer and poorer ground. But while good ground was much more available in former centuries, time pressure existed already in the ancient world: The Roman Latin architect P. Vitruv complained already 31 B.C. in his 10 books "De architectura" about low construction quality because of too short and strict time schedules.

The opposite of "Geopoker" is costly over-designing, which is definitively not an engineering art. The transition zone between these two extremes depends on numerous factors, whereby particular demands, costs, acceptable risk and failure consequences dominate. With regard to roads, for instance, this can be illustrated by a quotation of K. Terzaghi: *"A road exhibiting no failures or at least deficiencies along its alignment (slope cuts, embankments, structure/pavement) is overdesigned and hence too costly"*

Outstanding theoretical basis and best practice hardly count if clients order work on the basis of cost rather than quality. Hence, the geotechnical/civil engineers should increasingly convince clients of the importance of high quality. Proper site investigation, for instance, should not be seen as a necessary evil but as essential. In this connection it should be mentioned that - according to European statistics - about 80 to 85% of all building failures and damages are related to problems in the ground. Most failures are due to design or construction flaws.

This number could be reduced primarily by proper site investigation, more flexible/conceptual design plus observational method rather than rigid, fully-engineered design, and by stringent site supervision (performed by experienced geotechnical engineers but not by formalists). Designers should be involved in construction inspection/supervision (is the design intent being satisfied by the construction?) But it should be kept in mind that money cannot buy risk-free ground (Clayton 2000), even if ground investigation costs increased from usually between 0.1% to 1% of project costs to 5% and more. Residual risks are unavoidable, because ground is the greatest uncertainty in civil engineering.

Highly qualified work of civil engineering- and geotechnical designers and consultants, of laboratories or testing and research institutes should not be subjected to routinely performed bidding procedures. After all, in case of an illness, the client would certainly not collect bids to find a surgeon who would perform the operation at the lowest price, but he would look for the one with the highest qualification.

The use of project management teams in the construction industry is now wide-spread. This system, originating in the petroleum industry, was adopted first in the building Industry and later on for the public transportation infrastructure. It has proved successful in the latter field, but seems to a certain extent questionable in geotechnical engineering. But on the other hand, very positive contributions from project teamwork can be gained if geotechnical and structural engineers or geotechnical and infrastructure engineers cooperate. Moreover, civil/geotechnical engineers increasingly find themselves brainstorming within multidisciplinary teams.

Another tendency is to install commissions for solving difficult problems. This might be useful in politics and in international co-operations but not so much in regional civil/-geotechnical engineering projects. An exception is environmental engineering where several disciplines should co--operate. What we actually need, more than commissions, are real personalities with the ability and willingness to make decisions and to take responsibility. Already Charles de Gaulle criticized the increasing tendencies towards commissions when he ironically said: "*Why are the Ten Commandments so concise? Because they were not created by a commission*."

There is a certain danger that the development in civil/geo--technical engineering might not proceed as intensively as during the past decades. The main obstacles to progress are:

- Restrictions imposed by some codes which may be over-prescriptive or over-conservative.
- Unwillingness to adopt new design philosophies or site procedures (e.g. piled rafts, roller integrated continuous compaction control).
- Increasing tendency for non-geotechnical engineers and inexperienced geotechnical engineers to use complex programs for design (Poulos 2003).

Finally, there is a relation between advanced technology and civilization; nevertheless an advanced civilization may be uncultured. Hence, striving for technology, civilization and culture as an interacting trinity or a single entity should be the goal of education and professional practice. *The civil engineer should be a civilized engineer – and cultured too.*

4. Design

Design is becoming increasingly fragmental as specialist consultants and contractors are used, and as new forms of construction management are introduced. Design is a continuous process, requiring regular review to ensure that the client's needs are being met (Clayton 2001).

Moreover clients, pressure groups and the general public across all continents require their transport infrastructure, utilities and services constructed with minimum disruption to their daily lives and their respective local environments.

With regard to geotechnics, it should be emphasized that building in unstable, heterogeneous, or soft soil and rock includes a significantly higher calculated risk than is experienced by other branches of civil engineering. Consequently, proper design and construction require not only a firm theoretical knowledge but also comprehensive experience, engineering intuition, engineering judgment and the willingness to take responsibility. This involves in many cases design concepts, which need to be adapted during construction, or even in the long-term, according to the observational method. Monitoring is therefore essential, and an "active design" exhibits significant advantages over a conventional and rigid "fully-engineered design". Furthermore, creativity prefers conceptual design rather than detailed design resulting in solutions that reduce geotechnical risk by avoiding the hazards.

Failures and accidents will always happen. There are too many variables in ground, construction and structure to believe they won't, and it is a dangerous arrogance to assume otherwise. However small the actual risk, it is imperative to anticipate the worst-case scenario. *"Forewarned is forearmed"* should be an essential principle of active design, semiempirical design, and observational method.

Application of the observational method was pioneered by Terzaghi, and the principles were formally set down by R. Peck in his 1969 Rankine lecture. The essence of the observational method is that performance is monitored in such respects as to allow usually predetermined supplementary measures (according to a contingency plan) to be adapted where observation departs from accepted criteria for stability or deformation: The observational method facilities design changes during construction and establishes a framework for risk management. However, it is unfortunate that the method may be inappropriately associated with uncomfortably low safety margins (Powderham 2002).

In reality it is one of the most important tools for proper design, material savings, reduced construction times, and risk assessment in geotechnical engineering. The potential to make modifications during construction and to strengthen the structure at any time, even after construction, is a fundamental requirement of the observational method. It allows a continuous re-evaluation of the parameters used for design. "*Simplicity is at the heart of the observational method - a simplicity made comprehensive by good judgment*" (Peck, Powderham 1999). The observational method involves the concepts of the most probable and most unfavorable conditions, hence a creative process and not over-complication, but "highquality simplicity" (based on detailed ground investigation, prognoses and monitoring). Highquality simplicity does not forget the reasoning behind "simple" practices, because oversimplification, sometimes through so-called high-tech mechanistic calculations, can cloud one's engineering judgment.

In mountainous regions the soil and rock parameters frequently exhibit scatter, even within a small area, to such an extent that geotechnical calculations seem to provide merely border values and serve for reference only (Fig. 16). Due to steep slopes there is also the uncertainty of seepage flow. Therefore, the safety of such slopes cannot be proved conventionally by theoretical methods but only by "semi-empirical" design (Brandl 1979). The optimal solution can be achieved only step by step in connection with in situ measurements. It would be economically unjustifiable to construct most expensive structures by assuming the most unfavourable parameters (Fig. 17). Calculations and theoretical consideration are only the basis for the first design and for interpreting the measurements. This "semi-empirical" design method has proved successful under most difficult conditions for about 40 years.

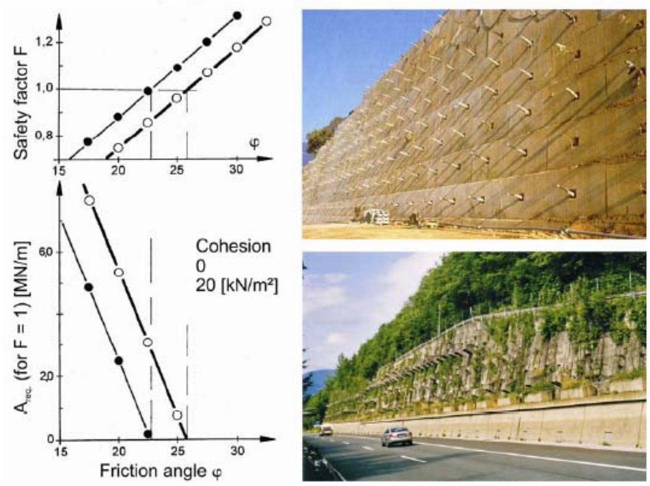


Fig. 16. Strong influence of the shear strength in unstable slopes on the stability of high retaining walls makes design, calculation and risk assessment difficult. Example: Changing the friction angle only by Δφ = 1° resulted in a change of the required anchor forces by ΔA = 1000 kN/m to gain limit equilibrium (F = 1). Actually, the friction angle scattered within a range of Δφ = 15°, and, moreover, the residual shear angle could decrease further.

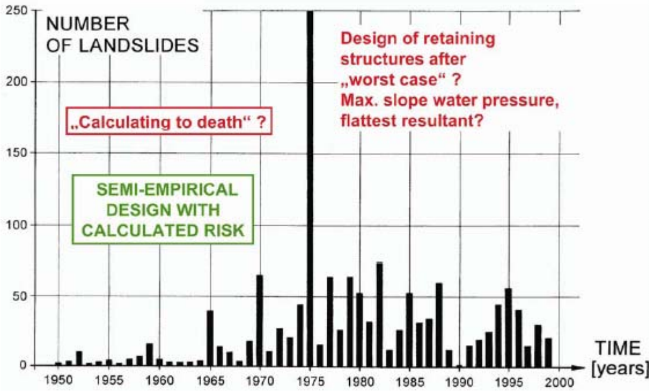


Fig. 17. Number of slope failures in Lower Austria between 1950 und 2000. Significant statistical outlier in 1975 (also in Salzburg, Carinthia – due to extremely unfavourable weather conditions).

A careful examination of ground condition and ground-structure interaction, as well as close monitoring before, during and after construction are vital to both the semi-empirical design method and the observational method. Moreover, a proper site investigation should be the basis of each serious design. There is an old saying that you pay for your site investigation, whether or not you do one.

Field observations are essential in geotechnical engineering. Not only for research and development, site control, feed-back of ground and structure response, but also in connection with the observational method. Already in 1936, K. Terzaghi stated in his presidential address at the first International Conference on Soil Mechanics and Foundation Engineering (Cambridge, USA): *"Our theories will be superseded by later ones, but the results of conscientious observations in the field will remain as a permanent onset of inestimable value."*

Aspects of sustainability should be widely integrated into a creative and integrated design and planning process of the built environment. They should be also integrated into the operation and management of the built environment throughout its life-cycle as some topics illustrate:

- Effect of the built environment on quality of life, in particular on social behaviour, leisure and mobility.
- Reduced and more efficient energy and material consumption in the built environment.
- Optimum balances between comfort and energy consumption of houses.
- Management strategies for the built environment to ensure maximum use of existing structures and infrastructure for different technical end economic conditions; in particular with regard to synergy effects.

If the development of novel techniques and more efficient sites is to continue, the regulatory framework needs to be open to these new ideas and solutions. Emphasis should be placed on integrated approaches / designs. Revolutionary design and construction improvements have been achieved hardly from the classical parts of geotechnics than by challenging the dogmas combined with ingenious engineering. One of many examples are plastics in geotechnical engineering, first widely opposed by conservative engineers. Meanwhile "geosynthetics" are used intensively worldwide (Fig. 18). It is estimated that about 400 000 km2 have been placed already. Another example are high embankments (up to 135 m) for traffic routes instead of bridges. The early criticism focused mainly on possible (differential) settlements or slope failures. However, long-term experience clearly exhibits the advantage of such earth structures over bridges (e.g. Fig. 19).

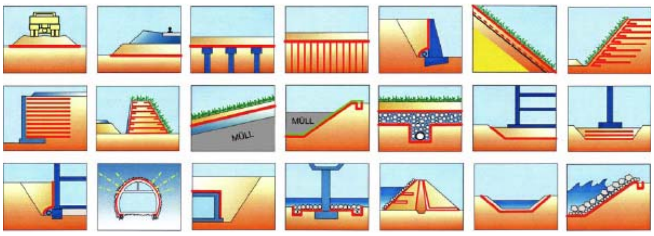


Fig. 18. Versatile application of geosynthetics; schematic selection.

Fig. 19. Highway embankments up to 135 m height instead of slope bridges and viaducts. Example Liesertal/Austria: 100 m high embankment (1980) now looks like a natural slope.

A practicable design should also consider the qualification of local workforce. What is a highly polished project good for, if the workforce (and site supervision) is poor?

Not only over-reliance on codes, standards or too strict regulations are an obstacle to good design but also rationalization, time pressure, and convenience. It is so much easier to replicate design and specification information from previous contracts, making adjustments as necessary to suit the new site or application. It is easier and quicker than initiating new and original design work which, while being groundbreaking in terms of engineering development, will take longer to produce, cost more man hours and run the risk of raising questions with the client or regulator. It is so much easier to stick to the same tried and tested solutions which can be simply reproduced and will not elicit any expensive questions (Atchison 2002).

Design-bid-build/lowest price contracting for high-value capital works seems to be out of fashion. It is considered expensive and takes too long. The alternatives range from design build/fixed price contracts to all-out private enterprise concessions with various forms of public-private partnerships (PPP) in between. But do these alternatives improve quality and safety? "Best-value" contracting instead of lowest-price contracting seems to be the better alternative in the long-term, especially for structures with a long design life. The "lowest bid is best"-philosophy is not the way to continue. This refers also to fees for design works. On the other hand, designers and consultants should not engage in cutthroat competition; this reduces inevitably quality, hence also their professional reputation.

5. Engineering ethics

In many countries, the construction industry has been exposed to severe criticism as a result of poor business behavior, malpractice, or even corruption. Illegal actions cannot be excused under any circumstances. For instance, price-fixing and bribery are against the law in most countries. In different cultures the lines between the acceptable and unacceptable are drawn differently, but these differences are "marginal rather than fundamental". If "gift giving" involves secrecy it is unacceptable. In 1999, 34 OECD countries signed the Anti-Bribery Convention making it a criminal offence to bribe foreign officials. So, why should the building industry take the law any less seriously than other industries?

The time is right for the engineering profession and the construction industry to take a public stance against corruption. Corruption has - among other things - the effect of lessening the amount of capital invested in locations where infrastructure is often desperately needed.

Questionable and even unethical are arrangements where consultants or designers are rewarded with success fees if they achieve savings in construction costs by recommending lesser or poorer materials. This will cause a decrease in quality and an inexcusable increase in risks. Unfortunately, the different results gained from different theories and assumptions facilitate such negative practices. After all, buildings, especially underground structures or embankments, etc. appear "stable" to the eye, no matter if they exhibit a "real" safety factor for instance of F = 1.05 or of F = 1.50.

Making money and high moral standards are in principle not contradictory. But price competition at the expense of technical quality should be avoided.

Natural uncertainties are unavoidable in geotechnical engineering, but safety standards should not be reduced additionally by low quality or brutal competition. In this connection the British social reformer John Ruskin (1819-1900) should be quoted. It might be of interest for clients, authorities and contractors alike:

"There exists hardly anything in this world that could not be produced in a lower quality and be sold at a lower price - and people who orientate themselves on the price only are the natural prey for such practices. It is not clever to pay too much, but it is even less clever to pay too little. When you pay too much, you lose some money - that's all. When, on the other hand, you pay too little, you sometimes lose everything, because the purchased object cannot fulfill its intended purpose. The law of economics does not allow to obtain big value for little money. If you take the lowest offer, you have to add something for the risk you take. And if you do that, you also have enough money to pay for something better than the lowest offer."

Lacking or even missing ground investigation in the design phase and/or during the construction phase are certainly the wrong way to save money. Numerous case histories have confirmed J. Ruskin's philosophy again and again (e.g. Figs. 20, 21).

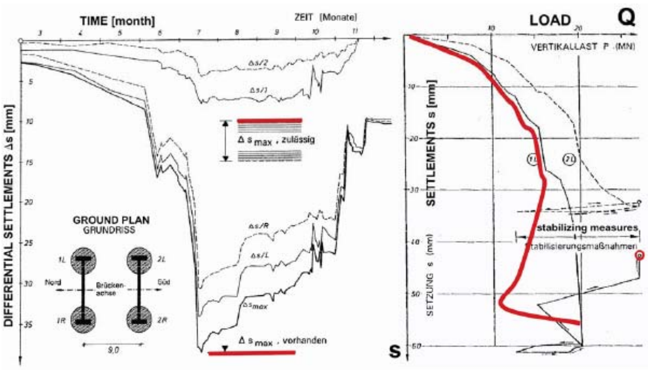


Fig. 20. Main pier of a 1.1 km long highway bridge close to collapse. Allowable differential settlement Δs_{max}, zulässig among the four foundation sockets of the twin pier were exceeded by 350 % (red). Load-settlement curve of two sockets theoretically already in the state of "failure". Successful re-tilting (Brandl, 1991).

Not the price and fancy juridical agreements should be in the center of negotiations, but the product, the "engineered building". Not the lawyer's but the engineer's word should carry the most weight.

Fig. 21. Collapse of a bridge due to lacking control of the specific ground properties during pile execution (no comparison of design assumptions and locally found soil).

The daily work of civil/geotechnical engineering has been done under increasing time pressure. Nevertheless, the attitude *"Better to offer a poorly conceived design or calculation than to be too late"* contradicts professional ethics (and may cause severe failures if supervisory control is missing). This refers also to tendering and following claims.

A lowest price tender that is significantly lower than its nearest competitor bid should be excluded.

"Value engineering" is a great concept potentially saving huge sums in construction costs, and in many cases, providing improved, safer design. (Osterberg 1999). *"Value engineering"* in the interest of the engineers' employer or client could be achieved if engineers (or other geotechnical professionals) followed the old rule of thumb: *"How would I do it if I were paying for it?"*

In many cases, ethics is only based on rhetoric and good intentions. Engineering societies have traditionally treated questions of professional obligation under the rubric of "engineering ethics". But how is it possible to move beyond platitudes? Should young engineers be prepared to abandon their careers rather than abdicate their moral responsibility? Should engineers have an ethical obligation not do be involved with weaponry not to work in the defence industry, etc.

The endeavour to come up with a uniform code of ethics that might be endorsed by all the major professional societies is decades old - and the search for virtues that nobody can define. In the end, each individual is accountable to an inner moral code, to his inner conscience. The Austrian philosopher Arthur Schopenhauer (1788-1860) once stated in his pessimistic-ironical manner: *"Ethics can as little help to become virtuous, as comprehensive aesthetics can teach how to create real works of art."*

Morality cannot be achieved by making noble-sounding proclamations. The morality we seek should be founded in the real world and be capable of practical application. It should be able to meet standards of both good will and good sense (Florman 1987).

Comprehensive statistical investigations of structural failures disclosed that insufficient knowledge has been the dominating type of human unreliability (followed by underestimation of influence, carelessness and error) e.g. Fig. 22. Most of the mistakes could have been detected in time by additional supervisory control. Consequently, the great need in engineering ethics is an increased emphasis on *competence*. Additional words are: *dedication*, *energy*, *self-discipline*, *caution*, *alertness*, *awareness* - and most of all *conscientiousness*. "The greatest threats to moral engineering are carelessness, sloppiness, laziness, and lack of concentration. An engineer may start out honest and high-minded but become immoral by falling prey to one or more of theses sins. On the other hand, an engineer who starts out by being conscientious must end up by being honest, since competent engineering, excellent engineering, is in its very nature the pursuit of truth. A conscientious engineer, by definition, cannot falsify test reports or intentionally overlook questionable data, cannot in any way evade the facts" (Florman 1987).

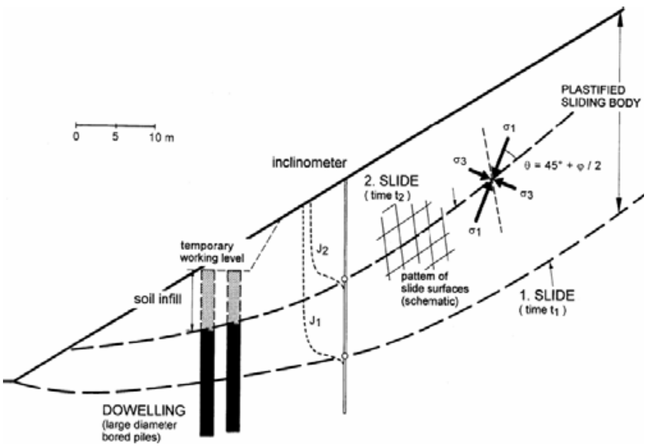


Fig. 22. Improper dowelling of sliding slope with bored piles which consisted of reinforced concrete only near the first slide zone. The refilling of the pile excavation above the initial slip only with soil allowed further slope failure due to a plastification of the whole slide body.

Ethics also means also humility and modesty, hence virtues that construction often has been lacking in the past decades. This is not inevitably the fault of architects and still less of civil or geotechnical engineers, but rather that of clients. Frequently, such "outstanding" projects or designs are determined by a tendency towards most striking features, sensations, or gigantism (megalomania), with display patterns and over-ambition being the driving forces. Thus, numerous unnecessary "superlatives" have been created.

Higher, *longer*, *larger*, *deeper* are the keywords of over-ambitious architecture and construction that approaches the limits of technical feasibility, the limits of what can be done and the limits what is sensible, rational, reasonable (Fig. 23).

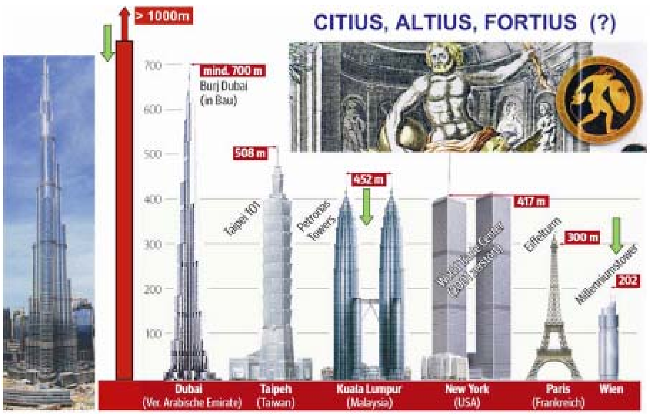


Fig. 23. Gigantism of high-rise buildings.

Sometimes ethical issues arise during an engineer's career regarding situations in which an engineer has a responsibility to blow the whistle. Consequently, ethics plays an important role in educating young engineers. It should help them when being faced with ethical dilemmas in the work environment.

Education in ethics is essential, because laws alone are insufficient to combat corruption. Laws are ineffective, for example, against acts that are not strictly illegal, that are committed, for example, in a socially and culturally tolerated zone that forms a gateway to dependencies. Therefore, the goal must be to define values such as incorruptibility and transparency as demands of the individual's conscience within the scope of professional ethics. Accordingly, several authorities and companies have started to use ethics awareness programs as a means of communicating ethical awareness to their employees.

As far as the economical and ethical part of the profession is concerned, a saying by Thomas Mann (1875-1955) is highly recommended: *"Enjoy your business activities during the day, but take on only such which let you sleep at night."* Personal integrity and a clear conscience have always been an assurance for a good night's sleep. The historical statement of the Roman Emperor Vespasian (70 AD) *"Pecunia non olet" ("money does not smell")* is sometimes quoted to justify lack of ethics. But this is a total misinterpretation because the original statement was exclusively referring to the fees collected for the use of public toilets and can therefore not be applied generally.

Finally a comment that refers not only to our profession but also to industry and engineering as a whole, to the economy, commerce, the world of business, etc., and sometimes even to the sciences: A society which regards brutal competition as the essential principle of all human activities will in the end destroy itself, because it will have stopped to consider itself as a group that strives for and shares the same values and goals; it will become a *"pool of sharks where everyone fights everyone else."*

Ethics should not be substituted by "monethics".

6. Future prospects and challenges

Civil engineering (geotechnical engineers commonly belong to this professional community) represents a highly interesting and always changing profession, which opens up for a variety of possibilities. In Germany, for instance, the building industry is still the biggest employer of industry, with hundreds of billions of Euro. About 80% of the national product - not including plots of land - are buildings, half of them apartments. The existing buildings have a value of trillions of Euro - and this substance can only be maintained with the help of civil engineers. Next to the building maintenance, the recycling processes and environmental problems represent the biggest chances for the future of civil engineers. The Austrian construction industry, for instance, shows by far the greatest potential for investment in the environmental sector, almost as high as mechanical engineering plus electrical engineering plus chemical and synthetic material industry put together.

In the European Community, about 30 million jobs depend directly on the building industry, which consequently is an important factor with regard to employment. Geotechnical engineering represents a key part of all building activities and of environmental protection worldwide.

In Europe and indeed globally, society faces unprecedented economic conditions, and at the same time, the world faces unprecedented environmental conditions. The imperative today is to deliver more for less: it is now crucial that civil engineers and the construction industry show that they can deliver "value for money". Additionally, civil engineers must also show how they deliver "value for carbon". This means that civil engineers have conflicting pressures: as well as the urgent need to reduce costs, there is another imperative - to reduce the carbon embodied in or used on the infrastructure they create (Hansford, 2011).

Design, construction, operation, maintenance and restoration of water supply and sewer systems in the rapidly growing mega-cities becomes an increasing challenge to civil engineering and especially to geotechnical engineering.

Novel technologies for upgrading sewage systems with minimal disruption to surface activities are also required to prevent polluting sewer discharges.

Drinking-water supply, sewage removal/treatment and waste disposal are essential elements of prophylactic medicine. Therefore, civil and geotechnical engineers are challenged to develop proper sewage and waste disposal systems in time to prevent serious outbreaks of communicable diseases.

The move into the next decades and the expected growth in transportation require an efficient and high-performing infrastructure all over the world. Safety and high-traffic flow is important, and any restrictions due to reconstruction and maintenance should be kept at a minimum.

Transportation infrastructure is widely influenced by the location of industry, local density of population and political decision, and - from an overall point of view - less by geotechnical aspects. This is a great challenge to our profession because good ground (high quality "greenland") for new buildings becomes increasingly rare in the densely populated zones of the world, but size and sensitiveness of buildings have increased. It will become more and more necessary to construct in such weak soils, unstable areas and seismic zones, which formerly could be avoided. Consequently, civil/geotechnical engineers are forced to present solutions, which often reach the border of feasibility. This refers not only to alignments and buildings of infrastructure but is generally valid.

In detail, therefore, geotechnical engineering has a great influence on the alignment, design, construction and maintenance of all "traffic and transportation arteries". Geotechnics facilitates the individual traffic, the supply of modern society with goods and the disposal of the resulting waste and sewage via roads, highways, railways, subways, harbors and waterways, airports, pipelines, water supply and sewerage systems, etc. (including tunnels and pipes, galleries, bridges, retaining structures, landslide stabilization, ground improvement, etc.).

Civil engineering enables the increasing 24 hour - traffic and transportation in urban areas by innovative technology. For instance, special road concrete makes complete road repair and re-use by heavy traffic/transportation possible within 12 hours.

Environmental protection from traffic routes gains increasing importance: Not only noise barriers but also barriers against groundwater contamination. Precipitation washes heavy metals and mineral oil hydrocarbons from road surfaces into the ground. In case of heavy traffic and groundwater protecting zones special liner systems are required.

Flood protection along rivers and coastal regions is a further challenge – especially considering the increase in number and magnitude of floods, and a rising sea level caused by a change in global climate. The design, construction and maintenance of safe dikes and dams, and their defense during catastrophic events, requires mainly the skills of civil/geotechnical engineers.

Land reclaiming, especially in densely populated coastal regions is another challenge to civil engineering. The Kansai International Airport in the Bay of Osaka (hitherto the world's largest man-made island), the Hong Kong Airport Check-Lap-Kok or Singapore's ambitious land reclaiming activities are outstanding examples of these activities.

Furthermore, geotechnical engineering could contribute essentially to a safety increase of tailings dams. Tailings impoundments are among the largest man-made structures with several of them approaching a billion tonne of stored sludge, sands, etc. Failures may therefore have a huge impact on the environment - and until recently they occurred at an unacceptable rate: at least ten times higher than those for conventional embankment dams (Davies et al. 2000). The dam failure in Kolontar/Hungary in autumn 2010 illustrates, that the safety situation or risk management resp. has hardly improved. Consequently, though tailings dams are only a cost to the mining process without generating a revenue like hydroelectric dams an increased awareness and emphasis on safety of tailings basins should be developed.

The rise in world population and living standard requires more and more energy. Hence the up-rating and refurbishment of existing power plants and the design and construction of new power plants are required. Small hydro projects are a valuable supplement to large-scale projects, and they save not-renewable natural resources like oil and reduce environmental impacts (air pollution). Small hydros certainly have a great future in the renewables-industry.

With the rapid economic and industrial growth of many regions, the development of water resources has become a vital element of the infrastructure to satisfy the increasing demand for energy, irrigation and drinking water supply. This development includes both, the construction of new facilities and the refurbishment of existing older plants.

Waste management (especially landfill engineering), the redevelopment of vacant or derelict land and contaminated site clearing represent additional geotechnical challenges. In this connection landfill mining should be mentioned as a promising waste management tool which simultaneously provides site remediation. This is a procedure whereby solid wastes which had previously been landfilled are excavated and processed to recover potentially useful materials including energy by incineration.

The combination of waste management and sustainable construction is another increasing challenge to civil engineering: For instance, the use of recycled concrete aggregates, exploiting wastes in concrete, the use fly ash and other residual (pre-treated or stabilized) wastes for embankments, roads and liner systems, etc. The conversion of waste and industrial by-products into beneficial products in the construction industry and the utilization of alternative construction materials as a substitute for primary materials provide advantages not only for the environment but also for civil engineering activities.

Waste management covers only a specific topic of environmental issues. The more comprehensive field is resources management, which involves raw materials, recycled materials as well as waste. Consequently, resources management has been included nearly for 20 years in civil engineering education and training act the Technical University of Vienna.

As far as site cleaning, contaminated land remediation, upgrading open old dumps to safe landfills, construction, operation and aftercare/monitoring of new waste disposal facilities, etc. is concerned, a geotechnical/civil engineer is surely more qualified to give a profound judgment than a so-called "environmental engineer". This European experience was also confirmed by Jan Hellings (2000): *"A trained civil/ground engineer is the best equipped to manage remediation projects and liaise with all the specialist advisers from allied professions."*

The rather imprecise and elastic term "environmental engineer" is increasingly used by politicians and in the public because it sounds so competent. But actually it can hardly be considered a special branch of studies with in-depth education, research and knowledge in specific fields. Commonly it is rather an encyclopedic mixture referring to boilogy, chemistry, civil engineering (including geotechnics), geology, hydrology, mechanical engineering, etc., whereby - as lies in the nature of such things - none of them are covered in real depth. Civil/geotechnical engineers, on the other hand, are specifically trained (or should be educated and trained!) for siting, contaminated land remediation, landfill engineering, waste and resources management, etc. A promising branch is geoenvironmental engineering as a combination of geotechnical and environmental engineering. To sum up, for a particular project, close co-operation of real (high-level) experts with specialized knowledge from different, relevant fields is most of the time more efficient than activities of so-called environmental engineers.

Meeting the needs of an ever increasingly thirsty world is another challenge for civil and geotechnical engineering - in cooperation with agricultural engineering, etc. Only about 10% of the global water consumption by mankind are used for domestic water supply; 20% are consumed by industry and 70% by agriculture. The area of irrigated land worldwide has increased more than thirtyfold in the past two centuries, turning near-deserts such as southern California and Egypt into food baskets. Artificial oasis cities have bloomed.

Another great long-term challenge which geotechnical engineers are going to face within the next decades is an enormous increase in tunnelling and underground work under all soil and rock conditions, especially in urban areas. It is estimated that by the year 2025 at least 100 mega-cities, each with a population of between 5 to 30 million, will exist, and the urbanization of the world will further increase. This requires huge amounts of different underground structures, especially tunnels. Already now the traffic tunnels in Western Europe alone have a total length of more than 10,000 km, which is four times the distance between Paris and Moscow.

Underground storage facilities are also increasingly needed. This requires not only new underground openings but could also make use of abandoned mines.

The following list gives an overview of important issues that represent key challenges to civil engineering, hence also to geotechnics. This list cannot be complete, nor does it show the individual concerns in any specific order of priority:

- Traffic and transportation infrastructure (construction and maintenance)
- Water management
- Resources management
- Waste management (solid and liquid)
- Hazard mitigation and prevention
- River management
- Power generation
- Irrigation systems
- Urban and industrial ecology
- Land reclaiming (Fig. 24)
- Abandoned and contaminated land remediation
- Renaturation of mining areas (Fig. 25)
- Environmentally sound subsurface construction technologies
- Maritime engineering, involving port, harbour, estuarine, coastal and offshore engineering.

Fig. 24. Example for the contribution of geotechnical engineering to land reclaiming (Dubai).

Fig. 25. Examples underlining the contribution of geotechnical engineering to renaturation (mining area Lausitz/ Germany; photographs L. Wichter). Left/top: open pit mining under operation. Right/top: ecologically dead landscape after closing the mining activities. Below: after renaturation.

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Keynote Lecture, 10th Slovak Geotechnical Conference Bratislava, 30. - 31. May 2011

ΘΕΣΕΙΣ ΕΡΓΑΣΙΑΣ ΓΙΑ ΓΕΩΤΕΧΝΙΚΟΥΣ ΜΗΧΑΝΙΚΟΥΣ

School of Engineering at University of Minho / Portugal

The School of Engineering at University of Minho / Portugal wants to hire four PhD students, in the framework of its strategic plan 2020. The work will be developed within two research projects: (a) sustainable management systems for the built infrastructure; (b) improvement of strategic infrastructure resistance against attacks.

The PhD candidates should address the following subjects:

1. Development and validation of an autonomous wireless and battery free sensor network for environmental and geotechnical measurements. The expected background of the candidate is electronic or communication engineering. Other suitable candidates can be considered.

2. Development and validation of a management system for infrastructure management, considering prevision and optimization methods. The expected background of the candidate is civil engineering. Other suitable candidates can be considered.

3. Development of fiber reinforced composites for strengthening and monitoring, using traditional and natural fibers. The expected background of the candidate is civil or textile engineering. Other suitable candidates can be considered.

4. Computational strategies for simulation of structures subjected to blast. The expected background of the candidate is civil or mechanical engineering. Other suitable candidates can be considered.

The grant value is about 1000 euro/month for a PhD (tax free), being the city of Guimarães well below the average living cost in European Union (EU15). The works should start as soon as possible, being the PhD grant for a preliminary period of 12 months, which can be renewed up to 36 months.

Candidates should send until **November 11, 2011** a copy of their Curriculum Vitae together with a copy of their graduate certificate to sec.estruturas@civil.uminho.pt, with a clear indication if they are applying to grant project #1, #2, #3 or #4.

CS SO

Senior / Principal Geotechnical Engineers

Recruiter : Card Geotechnics Limited
Posted : 10 October 2011
Ref : ALD02 and HAR01
Location : Godalming, Surrey, Harrogate
Sector : Civil, Geotechnical, Structural
Category : Civil Engineer, Design Engineer, Geotechnical Engineer, Modeller, Principal Engineer
Job Type : Permanent
Salary : Up to £30k

Card Geotechnics (CGL) is currently seeking TWO enthusiastic and dynamic Senior Geotechnical Engineers to join the teams in our Harrogate Office and Aldershot Office (shortly moving to Godalming).

The successful candidates will have graduated with a degree in geology, civil engineering or engineering geology and will have had 4 to 6 years experience with a specialist consultancy, or in a geotechnical/ geoenvironmental department of a larger consultancy. A further specialist post graduate degree will be an advantage.

Chartered candidates will have a distinct advantage in the selection process. You will need to have a sound understanding of UK geology and/or UK construction practice and be looking to build on your prior experience, taking on more responsibility by managing challenging projects. You will be expected to combine site work with the challenge of design and analysis work, and project management within a dynamic office environment.

In return for your effort and enthusiasm you will receive:

• A competitive salary and performance bonus
• Excellent project experience
• A stimulating and friendly working environment
• Early responsibility within a team ethos
• Opportunities to progress your career.

http://www.ncejobs.co.uk/job/2524034/senior-principal-geotechnical-engineers/?utm_source=jobfeed&utm_medium=feed&utm_campaign=Job%2bExtract%2b-%2bLive&ProcessedTrackID=3

CS SO

Civil / Geotechnical Design Engineer

Recruiter : Owen Jenkins Technical Recruitment specialists
Posted : 06 October 2011
Ref : OTJ 2011 997
Location : Central London
Sector : Civil, Geotechnical, Structural, Transport & Highways
Category : Civil Engineer, Design Engineer, Geotechnical Engineer, Principal Engineer, Project Engineer
Job Type : Permanent
Salary : Excellent salary or daily rate depending on experience and qualifications

Our client, a small specialist civil engineering consultancy, is looking to appoint an engineer (5-8years experience) in their London office. You will be a graduate civil or geotechnical engineer with demonstrable experience designing and supervising civil engineering projects, probably across multiple sectors. You need to be a self starter and will have the opportunity to get involved with full life cycle engineering and project management.

Great company, great opportunity.

My client will also consider someone on a contract basis.

http://www.ncejobs.co.uk/job/2523909/civil-geotechnical-design-engineer/?utm_source=jobfeed&utm_medium=feed&utm_campaign=Job%2bExtract%2b-%2bLive&ProcessedTrackID=3

CS SO

Project Engineers

Recruiter : itmsoil Services Limited
Posted : 06 October 2011
Ref : ATR00023/Project Engineer
Location : London
Sector : Civil, Geotechnical, Graduate, Structural, Transport & Highways

Category : Civil Engineer, Geotechnical Engineer, Graduate Engineer, Project Engineer, Site Engineer
Job Type : Permanent
Salary : 28K to 34K inc. London Weighting

We're looking for Project Engineers to join our dynamic team in Holborn, London. You will organise and deliver the installation of large scale geotechnical monitoring systems and assist your Project Manager and delivery team to achieve this, on time and within budget.

You'll attend progress meetings with our clients and our management team, undertake site visits to design bespoke monitoring systems, procure all equipment, and produce documentation, including method statements, risk assessments, RFIs, NCRs etc. You'll manage on-site installations, trouble-shoot problems and analyse and review instrumentation data using monitoring software.

We'll look to you to track project costs, provide feedback on progress and provide our Project Technicians with support and training. You'll provide inductions and briefings and carry out health and safety inspections.

You will need to be a well organised self-starter and problem solver, with strong interpersonal skills and real attention to detail. You will be computer literate, discrete, accurate and able to prioritise and organise your workload with ease.

You will have site based instrumentation or project experience and ideally be experienced in surveying or structural/geotechnical monitoring equipment and have experience of working in Civil Engineering or tunnelling environments.

You will have a Bachelors or Masters degree (or equivalent), with a background in Construction, Engineering or Earth Science. You will also have a full driving licence and the right to work in the UK.

http://www.ncejobs.co.uk/job/2523914/project-engineers/?utm_source=jobfeed&utm_medium=feed&utm_campaign=Job%2bExtract%2b-%2bLive&ProcessedTrackID=3

Assistant Project Manager

Recruiter : itmsoil Services Limited
Posted : 06 October 2011
Ref : ATR00038/Asst. Project Manager
Location : London
Sector : Civil, Geotechnical, Structural, Transport & Highways
Category : Civil Engineer, Contractors Engineering Manager, Geotechnical Engineer, Graduate Engineer, Project Engineer
Job Type : Permanent
Salary : £32K – £40K inc. London Weighting

itmsoil specialises in the design, manufacture, installation and monitoring of geotechnical and structural instrumentation and is the most innovative & dynamic group in our industry.

Due to continued growth, we are seeking an Assistant Project Manager to join our growing team. Working throughout the UK, but with a current focus on central London, you will assist the Project Manager in delivering itmsoil's structural monitoring services. You'll liaise with clients, develop and execute project work plans, assist in identifying resource needs and manage day to day project activities. You'll review deliverables, assist with client proposals, manage project documentation and communications with the project team and stakeholders.

You will be well organised, with excellent interpersonal and communication skills and be adept at problem solving. You will be computer literate, self-motivated and able to prioritise and organise your workload with ease.

Proficiency in Microsoft Word and Excel is essential. Proficiency in Primavera P6 or MS Project Software would be an advantage.

You will be qualified to degree level (or equivalent), with a background in Civil Engineering or Land Surveying and a good understanding of structural monitoring. You will also need to have a full driving licence and the right to work in the UK.

http://www.ncejobs.co.uk/job/2523916/assistant-project-manager/?utm_source=jobfeed&utm_medium=feed&utm_campaign=Job%2bExtract%2b-%2bLive&ProcessedTrackID=3

Design Engineer in VSL UAE Office

VSL-Intrafor is looking for design geotechnical engineers for projects mainly in Ground Improvement (Contractor). MSc + 2 years experience or BSc + 4 yr, preferably with experience in the Middle East. Looking for someone with consultancy background but with a pragmatic approach, site experience, and willing to go the extra mile to get things done and right.

VSL is a serious, international company and they are interested in a young colleague. Contact Mr Fran Francisco (Fran) Baez, from VSL-Intrafor.

Geotechnical Project Manager and Filed Geotechnical Engineers

LANGAN INTERNATIONAL is looking for Geotechnical Project Manager (Design) for their regional office in Abu Dhabi. MSc + 5–10 years experience is required.

Also they are looking for field geotechnical engineers with minimum 4 years experience.

Founded as a geotechnical specialty firm in 1970, LANGAN quickly became involved in many large, complex projects located throughout the United States. Langan International was formed to support global clients and partner with the world's elite design and construction teams around the world. After four successful decades, our reputation for providing innovative solutions that yield measurable value for our clients continually forges new enduring relationships for the firm and distinguishes LANGAN from the competition.

Contact Persons:

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ΠΡΟΣΕΧΕΙΣ ΓΕΩΤΕΧΝΙΚΕΣ ΕΚΔΗΛΩΣΕΙΣ

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

3^ο ΠΑΝΕΛΛΗΝΙΟ ΣΥΝΕΔΡΙΟ ΟΔΟΠΟΙΙΑΣ Νοέμβριος 2011, Πάτρα, http://portal.tee.gr/portal/page/portal/INTER_RELATIONS/INT_REL_P/SYNEDRIA_EKDHLWSEIS/2011/3odopoiias

TAILINGS AND MINE WASTE 2011, November 6-9, 2011, Vancouver, Canada www.tailingsandminewaste2011.org

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

ITA COSUF Workshop and AG-meetings Amsterdam and Amersfoort, The Netherlands, 14-15 November 2011, secretariat(at)ita-aites.org

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

SI11 9th International Conference on Shock & Impact Loads on Structures, 16 – 18 November 2011, Fukuoka, Japan, www.cipremier.com

GEOMAT 2011 First International Conference on Geotechnique, Construction Materials and Environment, Tsu City, Mie, Japan, November 21-23, 2011, http://gipremi.webs.com

2011 ICKGSS International Conference on Sustainable Application of Geosynthetics Technology Commemoration of 10th Anniversary of Korean Geosynthetics Society Foundation, 23 - 24 November 2011, Seoul, South Korea, Contact: hyjeon@inha.ac.kr

Geotechnical Engineering Conferences of Torino (XXIII Edition) EARTH RETAINING STRUCTURES AND SLOPE STABILIZATION: THEORY, DESIGN AND APPLICATIONS, 23-24 November 2011, Torino, Italy, www.cgttorino.org

EUCEET Association Conference "New trends and challenges in civil engineering education", November 24-25, 2011, Patras, Greece, www.euceet.upatras.gr

Piling & Deep Foundations Australasia, 28 - 30 November, 2011, Brisbane, Australia, http://www.pilingtechniques.com.au/Event.aspx?id=482914&MAC=CE

International Symposium on Advances in Ground Technology and Geo-Information (IS-AGTG), 1-2 December 2011, Singapore, www.is-agtg.com

☙ ❧

10th International Conference on Analysis of Discontinuous Deformation (ICADD-10) – "Back to the Future"
6–8 December 2011, Waikiki, Hawaii, USA
www.icadd10.org

"Back to the Future"

The Discontinuous Deformation Analysis (DDA) method has been making progress as a powerful numerical method in rock mechanics and engineering for the last two decades, particularly in dealing with and understanding the behaviour of discontinuous rock masses at engineering scale.

Since the first conference in 1995, ICADD has had 9 meetings and the last one ICADD-9 in Singapore received overwhelming response. The ICADD series will have its 10th meeting (ICADD-10) in 2011. As the previous meetings, ICADD-10 aims to exchange ideas and new developments in various discontinuous analysis methods, and to promote the application of the developed numerical methods in rock engineering. In addition, immersed with new modelling methods and techniques, ICADD-10 will also be a milestone event to look back on the past progress and look forward to the future development of discontinuous deformation analysis and other discontinuous methods.

We would like to invite colleagues in the numerical modelling and rock mechanics community to join this event to celebrate and to anticipate the progress of discontinuous numerical methods.

The theme of ICADD-10 is to summarise the progress of discontinuous numerical methods in the past decades and to advance toward the future development and application of discontinuous methods in geomechanics and geoengineering. The technical presentation will cover a wide scope of discontinuous numerical methods from algorithms and mechanics, to modelling techniques and application, including, but not limited to the following topics:

- Key Block Theory and Engineering Applications
- Discontinuous Deformation Analysis (DDA) Method
- Numerical Manifold Method (NMM)
- Distinct/Discrete Element Method (DEM)
- Applications of UDEC, 3DEC and PFC codes
- Meshless Method and Engineering Applications
- Contact Algorithms and Joint Contact Modelling
- Interfacing of Discontinuum and Continuum Methods
- Wave Propagation in Rock Joints and Jointed Rock Masses
- Deformation Analysis of Heterogeneous Materials
- Multi-Scale and Multi-Physics in Discontinuous Modelling
- Other Advanced Analytical and Numerical Methods in Rock Engineering
- Experiment and Measurement of Discontinuous Deformation
- Case Studies of Engineering Projects

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Email: contact@icadd10.org

☙ ❧

SGCC2011 International Symposium on Sustainable Geosyn-thetics and Green Technology for Climate Change (Retirement Symposium for Prof. Dennes T. Bergado), 7 to 8

December 2011, Bangkok, Thailand, www.set.ait.ac.th/acsig/sgcc2011

XTH Regional Rock Mechanics Symposium, 08-09 December 2011, Ankara, Turkey, www.tukmd.org.tr/sempozyumlar/index_eng.php

Ετήσια Επιστημονική Συνεδρία ΕΓΕ
6 Φεβρουαρίου 2012, Αθήνα

Το Δ.Σ. της Ελληνικής Γεωλογικής Εταιρίας, στα πλαίσιο των σκοπών της για διάδοση των πορισμάτων των γεωλογικών ερευνών, αποφάσισε την καθιέρωση **Ετήσιας Επιστημονικής Συνεδρίας** το πρώτο δεκαήμερο του Φεβρουαρίου κάθε έτους.

Η πρώτη Επιστημονική Συνεδρία θα πραγματοποιηθεί στις **6 Φεβρουαρίου 2012** στο Αμφιθέατρο του ΙΓΜΕ.

Παρακαλούμε όσοι συνάδελφοι επιθυμούν να παρουσιάσουν εργασία στην παραπάνω Επιστημονική Συνεδρία να αποστείλουν εκτεταμένη περίληψη **μέχρι 16/12/2011**. Τα πλήρη κείμενα των εργασιών (με περίληψη στα Αγγλικά) θα υποβληθούν την ημέρα της Συνεδρίας (6/2/2012). Οι προδιαγραφές θα αναρτηθούν στην ιστοσελίδα της Εταιρίας. Υπεύθυνη για την παραλαβή των κειμένων και όλων των περαιτέρω λεπτομερειών είναι η Αντιπρόεδρος της Εταιρίας Καθηγήτρια Αλεξάνδρα Ζαμπετάκη-Λέκκα (zambetaki@geol.uoa.gr), Πρόεδρος της Συντακτικής Επιτροπής.

The Geological society of Greece
50, Konstantilieri Str., 16531 Byron, Greece
http://www.geosociety.gr

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

3rd International Seminar on Earthworks in Europe, 19 – 20 March, 2012, Berlin, Germany, www.fgsv.de/veranstaltungen_international.html?&tx_jullee vents_pi1[showUid]=85&cHash=4153b585bc

Practices and Trends for Financing and Contracting Tunnels and Underground Works, 22-23 March 2012, Athens, www.tunnelcontracts2012.com

6th Colloquium "Rock Mechanics - Theory and Practice" with "Vienna-Leopold-Müller Lecture", 22-23 March 2012, Vienna, Austria, christine.cerny@tuwien.ac.at

GeoCongress 2012 State of the Art and Practice in Geotechnical Engineering, Oakland, California, USA, March 25-29, 2012, www.geocongress2012.org

16 - 19 April 2012, MINES ParisTech, Paris, France
www.saltmech7.com

SaltMech7 is the 7th congress of these dedicated to Mechanical Behaviour of Salt.

It will be organized by the Gesociences and Geoengineering Research Department of MINES ParisTech and The LMS of Polytechnique ParisTech.

The congress aims to provide a forum for academics, researchers and practitioners to exchange ideas and recent developments in the field of **Mechanical Behaviour of Salt**. It is also an opportunity for young researchers to present their work.

Symposium themes

1 Laboratory investigations and constitutive modeling
Microscopic observations, damage and healing, constitutive modeling
2 Coupled processes and hydro-chemical effects (THMC)
Thermal effects, salt permeability, mechanical-transport processes
3 Field measurements
In situ testing, monitoring, back analyses
4 Numerical modeling
Uncertainties on constitutive laws and data, behavior at large temporal and spatial scales, sensitivity studies, innovative modeling techniques
5 Dry mining - post-mining - backfilling
6 Liquid hydrocarbon storage and brine-production caverns
7 Gaseous hydrocarbon and compressed air energy storage
Consequences of high frequency cycling
8 Hazardous and radioactive waste disposal
9 Long term behavior - abandonment of underground structures

For more information, please contact :
Contact@saltmech7.com

TERRA 2012 XIth International Conference on the Study and Conservation of Earthen Architecture Heritage, 22 – 27 April 2012, Lima, Peru, http://congreso.pucp.edu.pe/terra2012/index.htm

GEOAMERICAS 2012 II Pan-American Congress on Geosynthetics, Lima, Perú, 2 - 5 May 2012 www.igsperu.org

16th Nordik Geotechnical Meeting, 9-12 May, 2012, Copenhagen, Denmark www.ngm2012.dk

Second
Southern Hemisphere International Rock Mechanics Symposium
SHIRMS 2012

14–17 May 2012, Sun City, South Africa

www.saimm.co.za

The first Southern Hemisphere International Rock Mechanics Symposium (SHIRMS) was held in October 2006 in Perth. This covered a wide range of topics in rock mechanics and proved to be very successful. The 2nd SHIRMS is to be held in South Africa during 2012 and promises to follow in the same tradition. The Symposium will be combined with the planned South African Rock Engineering Symposium (SARES 2012).

OBJECTIVES

To provide an international forum to present and discuss the latest developments in rock mechanics and geotechnical engineering.

TOPICS

- Fracture and damage of rocks
- Numerical modelling
- Constitutive models
- Rock mechanics data
- Deformable rock
- Underground rock mechanics
- Tunnelling
- Slope stability
- Caving
- Ground support
- Subsidence
- Seismicity
- Risk

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

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

EUROCK 2012 - ISRM European Regional Symposium - Rock Engineering and Technology, 27 – 30 May 2012, Stockholm, Sweden, www.eurock2012.com.

SECOND INTERNATIONAL CONFERENCE ON PERFORMANCE-BASED DESIGN IN EARTHQUAKE GEOTECHNICAL ENGINEERING, May 28-30, 2012, Taormina, Italy, www.associazionegeotecnica.it

INTERNATIONAL SYMPOSIUM & SHORT COURSES TC 211 IS-GI Brussels 2012 Recent Research, Advances & Execution Aspects of GROUND IMPROVEMENT WORKS, 30 May – 1 June 2012, Brussels, Belgium, www.bbri.be/go/IS-GI-2012

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

80th Annual Meeting - 24th ICOLD Congress, June, 2nd to 5th, 2012 - June, 6th to 8th, 2012, Kyoto, Japan, http://icold2012kyoto.org/

ISL 2012 NASL 11th International Symposium on Landslides, 3 ÷ 8 June 2012, Banff, Alta, Canada, corey.froese@ercb.ca, www.ISL-NASL2012.ca

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www.armasymposium.org

The focus of the Symposium is on fundamental, practical and educational issues facing our profession. Topics of interest include, but are not limited to:

- Rock mass characterization,
- Uncertainty/stochastics/probability,
- Rock physics and geophysics,
- Fracture mechanics and fracture propagation,
- Weak rocks, shales, rock salt, problem geomaterials, granular materials,
- Laboratory equipment and testing,
- Field testing,
- In-situ stress measurements, prediction and modeling,
- Coupled processes, heat, flow and transport,
- Numerical/analytical/constitutive modeling of rock and rock processes,
- Rock excavation and breakage, dynamic loading,
- Slope and open pit stability, foundations, dams,
- Stability/support of underground openings,
- Unconventional oil and gas development,
- Carbon sequestration,
- Hazard and hazard mitigation,
- Geothermal advancements,
- Waste disposal, seal integrity, underground storage,
- Remote sensing, monitoring, seismicity,
- New frontiers in geomechanics, and
- Education in rock mechanics and geomechanics.

Contact ARMA: Peter Smeallie, Executive Director
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(P) 703.683.1808 (F) 703.683.1815 (E) info@armarocks.org

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www.isegnet.org/2012/

The Symposium is the twelfth in a series of ISEG conferences which started in 1993 with the continuing objective of applying technical and social science knowledge from a diversity of disciplines to address critical issues in sustainable development. Conferences that have been hosted in North America, Asia, South America, Africa and Europe have drawn an average of 300 participants from 50 countries. These conferences are held biennially and rotated among different continents.

Thematic Areas

Selected papers will be considered for publication in peer-reviewed special editions of new ISEG Journal and other top journals in the area.

Environmental Geotechnology

- Site Monitoring/Characterization Systems
- Fate, Transport and Remediation of Contaminants
- Waste Containment and Impoundment Systems
- Global Scale Environmental Problems and Solutions
- Drought and Desertification
- Landslide Hazards
- Brownfields and Land Revitalization
- Soil-Waste Interaction

Energy and the Environment

- Hydraulic Fracturing
- Geological Carbon Sequestration
- Waste-to-Energy Systems
- Long-Term Nuclear Waste Containment
- Methane Recovery

Water Sustainability

- Surface and Ground Water Quality
- Erosion and Sediment Transport
- Watershed Management and Protection

- Water Conservation and Reuse

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ASTM Symposium on Dynamic Testing of Soil and Rock: Field and Laboratory, June 28 - 29 2012, San Diego, CA, USA, www.astm.org/D18symp0612.htm

Protection and Restoration of the Environment XI July 3-6, 2012, Thessaloniki, Greece, www.pre11.org

Shaking the Foundations of Geo-engineering Education, International Conference on Geotechnical Engineering Education, 4-6 July 2012, NUI Galway, Galway, Ireland, bryan.mccabe@nuigalway.ie

ANZ 2012 "Ground Engineering in a Changing World" 11th Australia-New Zealand Conference on Geomechanics, Melbourne, Australia, 15-18 July 2012, www.anz2012.com.au

A Symposium on EXPERIMENTAL STUDIES WITH GEOSYNTHETICS In Conjunction with 15th INTERNATIONAL CONFERENCE ON EXPERIMENTAL MECHANICS (ICEM15), Porto, Portugal, July 22-27, 2012, http://paginas.fe.up.pt/clme/icem15

Geotechnique Themed Issue 2012 "Offshore Geotechnics", www.geotechnique-ice.com

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

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ISRM Regional Symposium
II South American Symposium on Rock Excavations
8 – 10 August 2012, San Jose, Costa Rica

Contact Person: Marlon Jiménez
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Costa Rica
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E-mail: acgeo@cfia.or.cr

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ICSE-6, 6th International Conference on Scour and Erosion, 27-31 August 2012, Paris, France, www.icse-6.com

2nd International Conference on Transportation Geotechnics, 10 - 12 September 2012, Sapporo, Hokkaido, Japan, http://congress.coop.hokudai.ac.jp/tc3conference/index.html

7th International Conference in Offshore Site Investigation and Geotechnics: Integrated Geotechnologies, Present and Future, 12-14 September 2012, London, United Kingdom, peter.allan@geomarine.co.uk; zenon@tamu.edu

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

IS-Kanazawa 2012 The 9th International Conference on Testing and Design Methods for Deep Foundations 18-20 September 2012, Kanazawa, Japan, http://is-kanazawa2012.jp

ISC' 4 4th International Conference on Geotechnical and Geophysical Site Characterization, September 18-21, 2012, Porto de Galinhas, Pernambuco – Brazil, www.isc-4.com

SAHC 2011, 8th International Conference on Structural Analysis of Historical Constructions, October 15 – 17, 2012, Wroclaw, Poland, www.sahc2012.org

7th Asian Rock Mechanics Symposium, 15-19 October 2012, Seoul, Korea, www.arms7.com

International Conference on Ground Improvement and Ground Control: Transport Infrastructure Development and Natural Hazards Mitigation, 30 Oct - 2 Nov 2012, Wollongong, Australia www.icgiwollongong.com

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

32. Baugrundtagung with exhibition "Geotechnik", Mainz, Germany, 26 – 29 November 2012

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

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

GA2012 - Geosynthetics Asia 2012 5th Asian Regional Conference on Geosynthetics, 10 - 14 December 2012, Bangkok, Thailand, www.set.ait.ac.th/acsig/GA2012

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

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

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

Pam-Am UNSAT 2013
20-22 February 2013, Cartagena de Indias, Colombia
panamunsat2013.uniandes.edu.co

The 1st Pan-American Conference on Unsaturated Soils 2013 will take place in the Convention Center in Cartagena de Indias at the end of February 2013. The Convention Center is located in the heart of the historic city near the modern facilities of Cartagena's leading hotels.

This convention offers a stimulating mix of every aspect of the study of unsaturated soils. It will link together all of the substantial recent advances in fundamental knowledge, testing techniques, computational procedures and prediction methodologies and combine all of them with the company of experienced professionals from the Americas, and researchers from throughout the world.

Now is the time to discuss the challenges posed to us in the field of unsaturated soil mechanics for predicting the behavior of geotechnical works faced with extreme climatic events and to find long-lasting solutions for these situations.

The convention's varied social program will offer plenty of opportunities outside of the main events of the technical program for further meetings and chances to share ideas. Plus, the beautiful setting of Cartagena has a great deal to offer. Its colonial buildings, spectacular city squares and sandy white beaches often make people want to stay a little longer, or even stay forever!

One of the Spanish empire's most important Caribbean ports, Cartagena is easily one of the most beautiful cities in the world. It was declared historical and cultural patrimony of humanity by UNESCO in 1984. We would be pleased to welcome you to our city and to the conference!

Objectives

The soils of the Americas were produced by a wide range of geological processes and are affected by highly variable and extreme climatic conditions. These conditions are a breeding ground for the development of research into unsaturated soils.

The purpose of the First Pan-American Conference on Unsaturated Soils is to share field experiences and research among geotechnical engineers who deal with a broad range of subjects involving unsaturated soils. The mechanics of unsaturated soils could well have a special role in anticipating the effects of extreme climatic events on the behavior of geotechnical works. This is especially important now since these events are affecting the soils of the whole continent with increasing strength.

New topics involving multiphase porous media are also welcome. These include, but are not limited to, unsaturated rocks, multiphase media, freezing soils, geo-environmental problems and energy applications.

Conference topics

Unsaturated soil behavior

- Microstructure
- Water retention
- Stress-strain
- Volume change
- Strength
- Dynamics
- Temperature effects
- Chemical effects

Testing techniques
- Laboratory
- "In situ"
- Techniques for micro and meso-scale investigations
- Centrifuge testing

Geotechnical problems

- Flow and infiltration
- Soil-atmosphere interaction
- Foundations
- Slope stability
- Pavements
- Isolation barriers
- Soil cover systems for waste containment
- Embankment and dams
- Thermal problems
- Geo-environmental problems
- Natural hazards

Modeling

- Fundamentals
- Constitutive modeling
- Analytical solutions and numerical analysis

Case Histories

- Engineering applications
- Field monitoring
- Rain induced landslides

New Areas

- Unsaturated rocks, swelling rocks
- Rockfill mechanics
- Multiphase media (oil/water)
- Freezing soils and permafrost
- Energy issues (CO_2 sequestration, gas hydrates and gassy marine sediments)

Secretariat: Universidad de los Andes, Bogotá (Colombia)
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TU-SEOUL 2013

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

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

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

The venue city is Seoul, a progressive capital with a population of over 12 million. The city is surrounded by beautiful mountains with the centrally crossing Han River. Seoul has many outstanding attractions where the diverse traditional Korean cultures in part are well preserved as the city has been the capital since 1392. Visitors generally enjoy the mixture of the modern and traditional flavors of Korea. We believe that many of the attractions will make lots of good memories of Seoul and Korea. Participants can also experience "Hanryu" such as K-Pops and Korean TV series.

Each member of Local Organizing Committee will make sure that the symposium will be fruitful and memorable. Anticipating your continued cooperation and active participation for the forthcoming symposium, we look forward to welcoming you here in Seoul, Korea.

Symposium Topics

- Planning and use of underground space
- Geotechnical site investigation
- Cut and cover construction
- Conventional tunnelling
- Mechanized tunnelling/tunnel construction mechatronics
- Innovations for lining and reinforcement
- Monitoring and settlement control
- Risk management in tunnelling and underground construction
- Rehabilitation and repair of underground structures
- Tunnel maintenance and management
- Health and safety in tunnelling
- Training and education in tunnelling and underground works
- Case studies for mega projects of tunnels and underground space construction
- Sustainable use of underground space (green and energy industry applications)

General Secretariat
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Email : krtna@chollian.net
Website : www.tunnel.or.kr

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Fifth International Conference on Forensic Engineering Informing the Future with Lessons from the Past, 15-17 April 2013, London, United Kingdom, http://ice-forensicengineering.com

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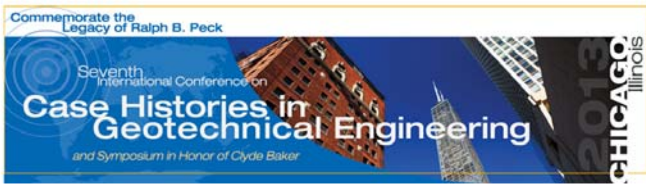

Conference to Commemorate the Legacy of Ralph B. Peck, 7th International Conference on Case Histories in Geotechnical Engineering & Soil Dynamics and Symposium in Honor of Clyde Baker, Chicago, USA, 29 April – 4 May, 2013, http://7icchge.mst.edu

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

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Effective and Sustainable Hydraulic Fracturing - an ISRM Specialized Conference
20-22 May 2013, Brisbane, Queensland, Australia

The Conference will focus on three technical themes:

1. Advancing Effectiveness presenting the latest advances in simulation, theory, field and laboratory experimentation, and case studies with an emphasis on petroleum resources

2. Exploring Versatility presenting methods and lessons from a diversity of application domains

3. Promoting Sustainability driving toward differentiation between real and perceived risks, deployment of viable controls, and beneficial public engagement.

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The 6th International Symposium on Rock Stress
20-22 August 2013, Sendai, Japan

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

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

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EUROCK 2013
ISRM European Regional Symposium
Rock Mechanics for Resources, Energy and Environment
23-26 September 2013, Wroclaw, Poland

Contact Person: Prof. Dariusz Lydzba
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ANDORRA 2014 14th International Winter Road Congress 2014, 4-7 February 2014, Andorra la Vella (Andorra), www.aipcrandorra2014.org

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

Contact Person: Prof. Leandro Alejano
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E-mail: alejano@uvigo.es

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8th European Conference "Numerical Methods in Geotechnical Engineering", Delft, The Netherlands, 18-20 juni 2014, www.numge2014.org

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

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13th ISRM International Congress on Rock Mechanics
Innovations in Applied and Theoretical Rock Mechanics
29 April – 6 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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ΝΕΑ ΑΠΟ ΤΙΣ ΔΙΕΘΝΕΙΣ ΕΝΩΣΕΙΣ

ISSMGE COUNCIL MEETING
2 October 2011, Toronto, Ontario, CANADA

Με την ευκαιρία του XIV Pan-American Regional Conference της ISSMGE διεξήχθη στο Τορόντο η Γενική Συνέλευση (Council Meeting), στην οποία η ΕΕΕΕΓΜ εκπροσωπήθη από το μέλος της Δρ. Νικόλαο Βλαχόπουλο, Assistant Professor στο Civil Engineering Department, Royal Military College of Canada & Geological Sciences and, Geological Engineering Department, Queen's University. Στη συνέχεια παρατίθεται σύντομη ανασκόπηση των εργασιών του συνεδρίου. Με έντονα γράμματα παρουσιάζεται η θέση της ΕΕΕΕΓΜ στα ερωτήματα της αλλαγής του ονόματος της ISSMGE, καθώς και του ανά τετραετία Διεθνούς Συνεδρίου της.

SUMMARY OF ACTIVITIES

I would like to express my gratitude for the opportunity to represent the Hellenic Society for Soil Mechanics and Geotechnical Engineering (HSSMGE) at the recent ISSMGE council meeting held in Toronto, Ontario, Canada on the 2nd of October 2011. It was an honour for me to represent our professional society and country.

The council meeting was well attended as more than 50 delegates from around the world attended this venue. In terms of the HSSMGE representation, my votes were consistent with the decisions of the HSSMGE's society members that are also attached to this letter.

Of note, is that the proposal from the HSSMGE in terms of the name of the quadrennial international conference from "ICSMGE" – "International Conference of Soil Mechanics and Geotechnical Engineering" to "WCSMGE" - World Conference of Soil Mechanics and Geotechnical Engineering", did NOT pass.

For the ICSMGE/WCSMGE name change proposal, I did read out the official proposal at the council meeting. The contingent from the United States of America seconded the motion for the name change. The ensuing discussions from various delegates concentrated on the grammar of the name change as in French the translation of "World" would be an adjective as opposed to a noun in its English version. As well, the word "World" did not seem to be in-line with the present name of the society itself (i.e. "International" designation in the name of the society). Unofficially, there were 35 votes AGAINST, 25 votes IN FAVOUR, and 3 ABSTENTIONS. A 75% majority is required for a motion to pass. As such, the proposal was defeated.

Regarding the voting on items of the agenda of the Council meeting at Toronto (Sunday, October 2), the HSSMGE vote that was cast was as follows:

6 Transfer of the Israel Geotechnical Society to the ISSMGE European Region. Vote to be taken.

YES (passed)

8 Amendment to Bylaws 5A.2 and 5A.5. Vote to be taken. Motion to be put to the meeting.

Present Bylaw 5A.2:

5A.2 Audited financial statements of receipts and expenditure shall be presented to each meeting of the Council for the period since the previous Council Meeting.

Proposed amended Bylaw 5A.2:

5A.2 Independently reviewed financial statements of receipts and expenditure shall be presented to each meeting of the Council for the period since the previous Council Meeting.

YES (passed)

Present Bylaw 5A.5

5A.5 An audited financial statement of receipts and expenditures shall be presented to each Board Meeting.

Proposed amended Bylaw 5A.5

5A.5 A financial statement of receipts and expenditures shall be presented to each Board Meeting.

YES (passed)

11 Change of name of the society from International Society for Soil Mechanics and Geotechnical Engineering" to "International Society for Geotechnical Engineering".

Proposal from ASCE-GI (USA), SMIG (Mexico), and Japanese Geotechnical Society.

The Executive Committee of the HSSMGE unanimously insists in keeping the word MECHANICS in the name of the Society. The majority of the Executive Committee members insist in keeping both words SOIL MECHANICS. MECHANICS is our science and ENGINEERING is the application of this science. An alternative proposal (compromise) is to change the name to INTERNATIONAL SOCIETY FOR GEOMECHANICS AND GEOENGINEERING. However, since this name is general, we will face problems with the International Society for Rock Mechanics.

NO (did NOT pass)

12 Change of name of the quadrennial international conference from ICSMGE - International Conference of Soil Mechanics and Geotechnical Engineering" to "WCSMGE - World Conference on Soil Mechanics and Geotechnical Engineering".

Proposal from the Hellenic Society for Soil Mechanics and Geotechnical Engineering.

Our International Society has its origins in the 1st International Conference on Soil Mechanics and Foundation Engineering, held in Harvard in 1936. A total of 206 delegates attended this conference from 20 countries, i.e. a very good international representation. Since then, with the interruption of the II WW, the quadrennial ICSMFE became an established pattern. The last, 17th, ICSMGE in Alexandria attracted more than 1,000 delegates from 81 countries, i.e. an excellent representation of the whole globe.

Further to the ICSMGE, our Society is organizing the quadrennial Regional Conferences, as well as a great number of International Conferences every year, directly by the TCs and the member societies or indirectly, under the auspices of the ISSMGE.

For differentiating the ICSMGE from the other, many-many, International Conferences, the Hellenic Society for Soil Mechanics and Geotechnical Engineering is proposing to change the name of the ICSMGE to WCSMGE - World Conference on Soil Mechanics and Geotechnical Engineering.

NO (did NOT pass)

Nicholas Vlachopoulos, PhD, PEng., CD, CME

Σχετικά με την αλλαγή του ονόματος της ISSMGE είχαν προηγηθή έντονες παρασκηνιακές διαβουλεύσεις το τελευταίο εξάμηνο. Η πρόταση για την αλλαγή προήλθε από τον Πρόεδρο της ISSMGE Jean-Louis Briaud και την Εθνική Ένωση των ΗΠΑ και υποστηρίχθηκε από χώρες της Κεντρικής Αμερικής και της Άπω Ανατολή, ενώ αντίθετες στην αλλαγή του ονόματος ήταν οι περισσότερες Εθνικές Ενώσεις των ευρωπαϊκών χωρών, η άποψη των οποίων επικράτησε τελικά.

Το ότι δεν εγκρίθηκε, τελικά, η πρόταση της ΕΕΕΕΓΜ για την αλλαγή του ονόματος του συνεδρίου, παρά την θετική αρχικά αποδοχή της όταν υπεβλήθη, οφείλεται μάλλον στην αντίθεση για οποιαδήποτε αλλαγή, και ενδεχομένως στο ότι η πρόταση υποστηρίχθηκε και από την Εθνική Ένωση των ΗΠΑ.

ISRM Council Meeting
Beijing, 17 October 2011

The ISRM held its Council meeting in Beijing, China, in conjunction with 12th International Congress on Rock Mechanics, organised by the ISRM National Groups of China and Singapore. 45 of the 48 National Groups were either present or represented. The Council was also attended by Past Presidents Prof. Ted Brown, Prof. John Franklin and Prof. Sunshuke Sakurai, the chairmen of the ISRM Commissions, representatives of the IAEG, the IGS and the ITA and the candidates to the election for Vice President 2011-2015.

Celebration of the 50th Anniversary of the ISRM

The ISRM was founded in 1962 by Prof. Leopold Müller in Salzburg and entered its 50th year of existence. Celebrations of the 50th anniversary will formally begin in the Congress banquet, on 20 October, and will continue until the 2012 Stockholm Symposium. A logo for this celebration was chosen in a competition open to young ISRM members, won by Dr Ludger Suarez Burgoa from Bolivia.

Another competition took place to select the best slide show on "The Future Directions of Engineering Rock Mechanics", which was won by Dr Ricardo Resende from Portugal. A book about the 50 years of the ISRM history is being prepared and will be launched in Stockholm next May. Other initiatives are being planned, which will be announced to the members.

Membership of the ISRM

The ISRM has now 6514 individual members and 123 corporate members, belonging to 48 National Groups. This represents an increase of 3.5% in the number of individual members since the last year and the highest number of individual members ever. One half of the members come from Europe, and one quarter from Asia. China is currently the largest National Group of the ISRM.

Report of the activities of the ISRM Board 2007-2011

The President Prof. John Hudson presented the main achievements and the modernization initiatives that were accomplished by the ISRM Board that will finish his term of office at the end of the Congress. In particular, he mentioned the launch of the digital library, the new and more productive operation of the Commissions, the revised News Journal, the launch of digital Newsletter, the upgrade of the website, the ISRM series of downloadable lectures, the videos for the election of the President and of the Vice Presidents and the continuous increase in the number of members.

Rocha Medal 2012

The ISRM Board decided to award the Rocha Medal 2012 to Dr Maria Teresa Zandarin from Argentina for the thesis "Thermo-hydro-mechanical Analysis of Joints. A Theoretical and Experimental Study" presented at the Polytechnic University of Catalonia, Spain. She will receive the award at the 2012 ISRM International Symposium in Stockholm. Two runner-up certificates were also awarded to Dr Bryan Philip Watson from South Africa for the thesis "Rock Behaviour of the Bushveld Merensky Reef and the Design of Crush Pillars" presented to the University of the Witwatersrand, South Africa, and to Dr Joshua Taron from the USA for the thesis "Geophysical and Geochemical Analyses of Flow and Deformation in Fractured Rock" presented to the Pennsylvania State University, USA.

ISRM Digital Library

The ISRM digital library was launched last year in New Delhi and contains the papers and the keynote lectures published in the ISRM Congresses and sponsored Symposia, thus giving them a greater visibility and making them available to all the rock mechanics professionals. The ISRM digital library is part of OnePetro, a large online library managed by the Society of Petroleum Engineers. ISRM individual members registered on the ISRM website are allowed to download, at no cost, up to 100 papers per year from the ISRM conferences, and ISRM corporate members can download 250 papers. To register on the OnePetro website (www.onepetro.org) as an ISRM member, the only necessary information is the username and the password used to access the members' area of the ISRM website. Nonmembers can purchase the ISRM papers online. The ISRM digital library has now 4,000 papers published in 21 conferences, and these numbers will to continue to increase.

Communication

The website is the main source of information about the Society and most benefits are offered to the members in a password protected members' area. One of the main items on the website in 2011 was the set of videos produced by the candidates to Vice President.

The digital newsletter is distributed 4 times per year and can be subscribed on our website. It includes news about the society and other news related to rock mechanics. Contributions are welcome, with short news on rock mechanics issues of general interest.

The News Journal, Issue N. 13, December 2010, was distributed in paper to all members and includes a summary of the activities of the Society, plus technical articles. An electronic version can be read on the website or can be downloaded. In order to reduce the large cost of printing and distribution hard copies of the News Journal, the ISRM members will, from now on, receive electronic versions only.

Commissions

Reports were presented on the activities of the Commissions. The following Commissions are now active:

- Application of Geophysics to Rock Engineering
- Preservation of Ancient Sites
- Testing Methods
- Mine Closure
- Rock Engineering Design Methodology
- Radioactive Waste Disposal
- Rock Dynamics
- Education
- Spalling

Reports were also presented by five Commissions that are now starting their activities:

- Underground Research Laboratory Networking
- Petroleum Geomechanics
- Hard Rock Excavations
- Coupled THCM processes in geological materials and systems
- Crustal Stress and Earthquakes

The Board of the ISRM for 2011-2015 was elected

Following the election of Prof. Xia-Ting Feng from China for ISRM President 2011-2015 two years ago, the Council elected in Beijing the six Regional Vice Presidents: Mr Jacques Lucas (South Africa) for Africa, Dr Yingxin Zhou (Singapore) for Asia, Dr David Beck (Australia) for Australasia, Prof. Frederic Pellet (France) for Europe, Dr John Tinucci (USA) for North America and Dr Antonio Samaniego (Peru) for South America. The newly elected Board met immediately after the Council to elect Dr Antonio Samaniego as the 1st Vice President, to appoint Prof. Yuzo Onishi and Prof. Ivan Vrkljan as Vice Presidents at Large and to reappoint Dr Luís Lamas as Secretary General.

ΕΝΔΙΑΦΕΡΟΝΤΑ ΓΕΩΤΕΧΝΙΚΑ ΝΕΑ

Will Big Ben be the next Leaning Tower of Pisa?
Pisa expert says Big Ben leaning

Whether the British parliament is leaning to the left or right depends on your point of view but Big Ben is officially tilting.

And surveyors say it is getting worse.

A new report has found the top of the famous clock tower, which stands above the parliament in central London, is now just under half a metre off the perpendicular.

Monitoring instruments suggest the tower's tilt has increased by about a centimetre a year since 2003

That is so far off that experts believe the tilt is visible to the naked eye.

"The tilt is now just about visible," said John Burland, a senior research investigator from Imperial College London who has worked on Big Ben and the Leaning Tower of Pisa.

"You can see it if you stand on Parliament Square and look east, towards the river. I have heard tourists there taking photographs saying 'I don't think it is quite vertical' - and they are quite right," he told the *Sunday Telegraph*.

"If it started greater acceleration, we would have to look at doing something but I don't think we need to do anything for a few years yet."

Civil engineers believe the tower is sinking more quickly on the north side than the south side of the Palace of Westminster.

Monitoring instruments have suggested the tilt has increased by about a centimetre a year since 2003, about 40 per cent faster than the long-term average.

The tower is now leaning towards the northwest at an angle of 0.26 degrees, meaning the top of the tower is 43.5cm from vertical.

It would take another 4000 years or so for it to match the angle of the Leaning Tower of Pisa, which leans by about four degrees.

The problem has been blamed on decades of building work around the foot of the 96-metre, 11-storey structure since completion in 1858.

These have ranged from a sewer built for a tube line and an underground car park for MPs in the 1970s.

(The New Zealand Herald/Australian Associated Press, 11 October 2011)

Scientists See Evidence of Great Earthquake Clusters

Scientists believe there is evidence that great earthquakes occur in clusters over a period of years and that a significant event is on the horizon, according to a report from catastrophe modeler Eqecat.

The report, "Spatial and Temporal Earthquake Clustering: Part 1, Global Earthquake Clustering,"(*) lays out evidence that giant earthquakes of magnitude 8 or higher may occur in clusters over a decade or more.

The authors of the report, Paul C. Thenhaus, Kenneth W. Campbell and Mahmoud M. Khater, say the occurrences of great and giant earthquakes "on a global scale cannot be attributed to chance."

They say the giant Andaman-Nicobar (Sumatra, Indonesia) earthquake of 2004 of magnitude 9.1 began "a new cycle of global great earthquake activity."

If this cycle follows the cycle of earthquakes in the 1950-1965 timeframe, "we may be only about halfway through the cycle, and the largest earthquake in the current cluster may not have yet occurred.

During that period starting 1950, there were three earthquakes of magnitude 9 or higher:

- Kamchatka, magnitude 9 that struck in 1952.
- Prince William Sound, Alaska, magnitude 9.2 that struck in 1964.
- Chile, magnitude 9.5 that struck in 1960.

Why this is happening is unknown, they say, but it may have something to do with "post-seismic relaxations and strain transfer mechanisms in the deep ductile layers of the Earth."

If earthquakes follow the pattern of the 1900s then a third major earthquake is a very real possibility.

So far this century, there has been the Indonesia 9.1 earthquake that struck in 2004 and then the Tohoku-oki earthquake and tsunami in 2011 which was a magnitude 9 earthquake.

Regarding how destructive an earthquake is, whether it is devastating or not has less to do with magnitude than other factors such as proximity of "occurrence to population centers, construction vulnerability to shaking, soil stability, and local soil, basin and topographic amplification.

"This distinction between earthquake consequences and magnitude is important," the report notes. '"Devastating earthquakes' as a class have only an obscure relationship to magnitude."

The report is the first in a series of three reports Eqecat plans to produce on this subject of global clusters of damaging earthquakes.

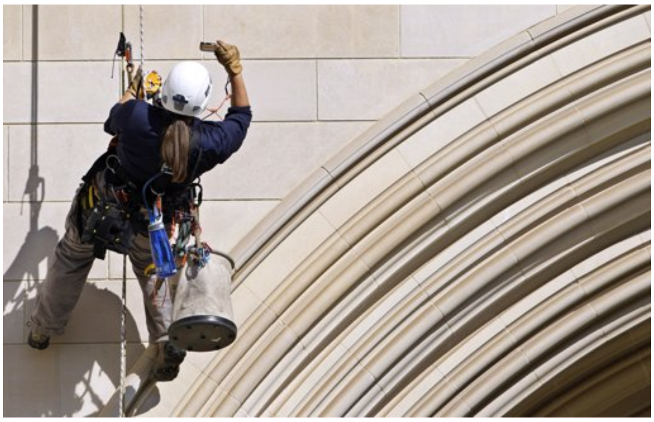
(*) http://www.eqecat.com/pdfs/global-earthquake-clustering-whitepaper-part-1-2011-10.pdf?mkt_tok=3RkMMJWWfF9wsRonvK7OZKXonjHpfsX57O4qXLHr08Yy0EZ5VunJEUWy2ocHStQhcOuuEwcWGog8xR1dGeGB

(Mark E. Ruquet / PropertyCasualty360.com, 17 October 2011)

Rappelling engineers inspect quake-damaged National Cathedral in Washington, D.C.

The same engineers who captivated tourists and passersby by rappelling down the Washington Monument began a similar operation Monday at the National Cathedral, the other major landmark to be damaged by an earthquake that shook the nation's capital.

The "difficult access team" from Wiss, Janney, Elstner Associates, Inc. began its work Monday when Emma Cardini emerged at the top of a 234-foot tower. She was joined minutes later by Katie Francis and, using ropes and harnesses, the two women efficiently worked their way down the front of the building.



Katie Francis, a member of the difficult access team of engineer, takes photographs

The inspection is expected to last about two weeks, said Dan Lemieux, who heads WJE's Fairfax, Va., office and is supervising the project. The engineers are looking for loose, cracked or unstable stones that could pose a risk to people on the ground. Those stones will be removed before the cathedral's scheduled reopening on Nov. 12.

Members of the difficult access team of engineers Katie Francis, left, and Emma Cardini

Last week, stone masons removed 2 tons of stonework from a pinnacle damaged by the 5.8-magnitude earthquake on Aug. 23. Three of the four pinnacles on the 300-foot central tower were severely damaged and the 2-ton section had shifted off its base.

The 4-foot-tall top portions of the pinnacles, called the finials, fell off during the earthquake and crashed onto the cathedral roof. The cathedral sustained additional damage during Hurricane Irene, the Category 1 storm that blew through Washington five days after the quake.

Initial repairs to the cathedral are expected to cost at least $15 million, and the price tag for fully restoring the building remains unknown. The cathedral was completed in 1990 after 83 years of work. A campaign has begun to raise $25 million by the end of 2012.

Four of the five engineers who climbed out windows and a hatch atop the Washington Monument are participating in the cathedral inspection. While the monument descent was more dramatic, the cathedral has more variety, said Erik Sohn, one of the climbers.

"The Washington Monument is such a huge, historic structure, but it's relatively stark while you're up there on the side of the building. There's not a whole lot to look at," Sohn said. "This, with all the ornamentation that we're going to be crawling around and touching and feeling, it's more entertaining for us."

The engineers will be carrying masonry tools, iPads and other equipment that allows them to inspect the stones, remove them as needed and document their findings.

Cathedral officials are confident that the building will be declared safe well ahead of Nov. 12, when the Rev. Mariann Budde will be consecrated as the ninth bishop of the Episcopal Diocese of Washington, cathedral spokesman Richard Weinberg said. The cathedral will reopen to the public the next day, with Budde presiding over services.

The cathedral, located on one of the highest points in the District of Columbia, is an Episcopal church but pursues a mission of spiritual harmony. It has hosted inaugural services and funerals for several presidents.

(YAHOO News, 17 October 2011)

Η αψίδα στο Nagasaki

Nagasaki 1945, μετά την έκρηξη της ατομικής βόμβας

Nagasaki 2011, μετά από τον σεισμό και το τσουνάμι

Από τι υλικό είναι φτιαγμένη η αψίδα;

(από Δρ. Νίκο Μουτάφη)

«Τσουνάμι» χτυπά στην Κρήτη την Δευτέρα 24 Οκτωβρίου 2011…

«Δεκάδες χιλιάδες ξεσπιτωμένοι άνθρωποι. Πλημμυρισμένες και κατεστραμμένες παραλιακές περιοχές που σήμερα θεωρούνται τα «φιλέτα» της τουριστικής οικονομίας. Κατεστραμμένες υποδομές, όπως το αεροδρόμιο «Ν. Καζαντζάκης» του Ηρακλείου, το εργοστάσιο της ΔΕΗ στα Λινοπεράματα, ο βιολογικός καθαρισμός των Χανίων, τα τηλεπικοινωνιακά δίκτυα. Κλειστά λόγω των κυμάτων ή των κατολισθήσεων τμήματα του Βόρειου Οδικού Άξονα και των δρόμων που οδηγούν προς τα Νότια της Κρήτης. «Γονατισμένες» οι υπηρεσίες Πολιτικής Προστασίας στην Κρήτη περιμένουν με αγωνία την συνδρομή των ομάδων διασωστών από τις Ευρωπαϊκές και άλλες χώρες.»

Αυτό είναι το σενάριο της μεγάλης πανευρωπαϊκής άσκησης η οποία θα πραγματοποιηθεί σε πρακτικό επίπεδο το διήμερο Δευτέρα – Τρίτη 24 και 25 Οκτωβρίου σε Ηράκλειο και Χανιά.

Πρόκειται για μια άσκηση η οποία βασίζεται στις επιπτώσεις στην σημερινή Κρήτη, ενός σεισμού αντίστοιχου με εκείνον που συνέβη τον Ιούλιο του 365 π.Χ.

Τότε που ένας υποθαλάσσιος σεισμός μεγέθους 8 και άνω Ρίχτερ στην θαλάσσια περιοχή Δυτικά της Κρήτης προκάλεσε όχι μόνο τεράστιες γεωλογικές αλλαγές στο νησί, αλλά και τεράστιες καταστροφές που επιδεινώθηκαν από ένα γιγαντιαίο κύμα τσουνάμι με αποτέλεσμα την καταστροφή των πόλεων της Κρήτης και χιλιάδες νεκρούς.

Η πανευρωπαϊκή άσκηση με την επωνυμία «Ποσειδών» πραγματοποιήθηκε «επί χάρτου» στα τέλη του περασμένου Μαΐου και συνεχίζεται στις 24 και 25/10 σε πρακτικό επίπεδο με την συμμετοχή των εξής φορέων :

Δ/νση Πολιτικής Προστασίας της Αποκεντρωμένης Διοίκησης Κρήτης. Εθνικές Αρχές Πολιτικής Προστασίας της Ε.Ε. και ειδικότερα της Ελλάδας (Γενική Γραμματεία Πολιτικής Προστασίας) και της Κύπρου (Πολιτική Άμυνα). Ίδρυμα Τεχνολογίας και Έρευνας (ΙΤΕ). Ελληνικός Ερυθρός Σταυρός-Σώμα Εθελοντών Σαμαρειτών και Ναυαγοσωστών. Τεχνολογίες Τηλεϊατρικής (Γαλλία) και Πολιτική Προστασία Χωρίς Σύνορα (Γαλλία).

Πυροσβεστικό Σώμα, 3η ΕΜΑΚ, ΕΛ.ΑΣ, Ένοπλες Δυνάμεις, Λιμενικό Σώμα, 7η Υγειονομική Περιφέρεια Κρήτης, ΕΚΑΒ, Περιφέρεια Κρήτης, Π.Ε. Χανίων και Ηρακλείου, Δήμοι Ηρακλείου & Χανίων, Ε.Ε.Σ., Ραδιοερασιτέχνες Κρήτης.

Άσκηση επί χάρτου

Μιλώντας στο Flashnews.gr, για την άσκηση «Ποσειδών», ο καθηγητής Φυσικών Καταστροφών κ. Κώστας Συνολάκης είχε επισημάνει πως με βάση τα δεδομένα που υπάρχουν για τον σεισμό και το τσουνάμι του 365 π.Χ. στην άσκηση επί χάρτου «κοιτάζαμε να δούμε βάση μιας ακολουθίας μόλις γίνει ο σεισμός, αν θα πέσουν κτίρια, τι θα γίνει και από κει και πέρα, από την στιγμή που έχουμε τσουνάμι, να δούμε τι καταστροφές υπάρχουν, πως μπορούμε να αντιδράσουμε στην Κρήτη αφού ξαφνικά δεν θα έχουμε τηλέφωνα, δεν θα έχουμε ηλεκτρικό, πως θα γίνουν οι επικοινωνίες, οι συγκοινωνίες, στα βουνά θα γίνουν κατολισθήσεις και θα κλείσουν δρόμοι προς τα Νότια.»

Εκκένωση σε 30 λεπτά

Εάν επαναληφθεί ο σεισμός του 365 π.Χ. και σε ότι αφορά στον χρόνο που θα υπάρχει για να εκκενωθούν οι παραλιακές περιοχές, σύμφωνα με τον κ. καθηγητή «εάν το Εθνικό Αστεροσκοπείο κάνει την δουλειά του σωστά και μας δώσει προειδοποίηση μέσα σε 4-5 λεπτά, έχουμε περίπου μισή ώρα για να κάνουμε εκκένωση του πληθυσμού στην Βόρεια Κρήτη. Μιλάμε για 30 λεπτά για τα Χανιά και 35 λεπτά για το Ηράκλειο.

Είναι αρκετός χρόνος για να κάνουμε εκκένωση και να μην έχουμε θύματα. Στην Ιαπωνία ο χρόνος ήταν μικρότερος και έκαναν πολύ καλές εκκενώσεις.»

Το αεροδρόμιο Χανίων μόνη πύλη εισόδου στην Κρήτη

Συνεχίζοντας την περιγραφή του εφιαλτικού σεναρίου της άσκησης ο κ. Συνολάκης τόνισε ότι «επειδή ουσιαστικά θα έχει «γονατίσει» η Ελληνική πολιτική προστασία θα χρειαστούν να έρθουν διασώστες από το εξωτερικό, το ζητούμενο λοιπόν ήταν το πώς μπορούν να έρθουν διασώστες στην Κρήτη για να μας βοηθήσουν.

Όπως είδαμε στην Ιαπωνία αλλά και σε άλλους μεγάλους σεισμούς, τα λιμάνια ουσιαστικά θα κλείσουν τουλάχιστον για μερικές μέρες καθώς θα έχουν καταστροφές. Τα λιμάνια λοιπόν δεν μπορούμε να τα υπολογίζουμε. Και στην Βόρεια και στην Νότια Κρήτη. Ίσως μόνο το λιμάνι της Ιεράπετρας να μπορέσει να δουλέψει, αλλά τα λιμάνια των Χανίων και του Ηρακλείου, δεν μπορούμε να τα υπολογίσουμε αν γίνει αυτό το σενάριο και βεβαίως καμιά φυσική καταστροφή δεν είναι ίδια με την προηγούμενη.

Όμως στην άσκηση προέκυψε ότι δεν μπορούμε να υπολογίζουμε και τα αεροδρόμια του Ηρακλείου, καθώς και του μικρού αεροδρομίου που υπάρχει στο Τυμπάκι. Το αεροδρόμιο " Ν.Καζαντζάκης" του Ηρακλείου κινδυνεύει να μην είναι αξιοποιήσιμο, άρα όταν μας έρθουν οι διασώστες, ουσιαστικά η μόνη πύλη της Κρήτης θα είναι το αεροδρόμιο των Χανίων, το οποίο δεν επηρεάζεται από τσουνάμι λόγω υψομέτρου.

Ουσιαστικά είναι το μόνο αεροδρόμιο που έχουμε στην Κρήτη – ίσως και το μικρό στην Σητεία – το οποίο θα μπορούσε να αξιοποιηθεί για να έρθουν διασώστες».

Επιπλέον στην διάρκεια της άσκησης επί χάρτου προέκυψε πως στην καλύτερη των περιπτώσεων η πολύτιμη συνδρομή από τις άλλες χώρες δεν θα έρθει νωρίτερα από 6-7 ώρες.

Να σημειωθεί πως στην μεγάλη επιχειρησιακή άσκηση αντιμετώπισης των επιπτώσεων του σεισμού και του τσουνάμι θα γίνει την επόμενη εβδομάδα θα υπάρχουν παρατηρητές από 30 και πλέον χώρες που συμμετέχουν στον Ευρωπαϊκό Μηχανισμό Πολιτικής Προστασίας.

Τι θα συμβεί στο παλιό λιμάνι των Χανίων

Μια καταπληκτική και συνάμα εφιαλτική προσομοίωση των επιπτώσεων για το παλιό λιμάνι των Χανίων από το "τσουνάμι των 1000 ετών", δημιούργησε το τμήμα Φυσικών Καστροφών του Πολυτεχνείου Κρήτης με επικεφαλής τον καθηγητή κ. Κώστα Συνολάκη στο πλαίσιο της πανευρωπαϊκής άσκησης "Ποσειδών" για τις επιπτώσεις ενός σεισμού αντίστοιχου με εκείνον που είχε πλήξει την Αν. Μεσόγειο το 365 π.Χ.

Αποτίμηση και αξιολόγηση της άσκησης

Στις 26 Οκτωβρίου 2011 στην Αποκεντρωμένη Διοίκηση Κρήτης στο Ηράκλειο, πραγματοποιήθηκε η αποτίμηση και αξιολόγηση της άσκησης «Τσουνάμι μετά από ένα ισχυρό σεισμό στη Μεσόγειο» που πραγματοποιήθηκε στο Ηράκλειο και στα Χανιά.

Η αξιολόγηση έγινε από μέλη και εκπροσώπους της Ευρωπαϊκής Επιτροπής αλλά και από παρατηρητές της Εθνικής αποστολής από την Γενική Γραμματεία Πολιτικής Προστασίας.

Από την αξιολόγηση βγήκαν πολύ θετικά στοιχεία και ήταν ιδιαίτερα θετικά για την ανταπόκρισή μας από τα Χανιά σε αυτήν την άσκηση.

Επισημαίνουμε ότι η άσκηση αυτή έγινε με την συμμετοχή Εθνικών αλλά και ξένων δυνάμεων είχε μεγάλο βαθμό δυσκολίας αφού η έκταση και πολυπλοκότητά της ήταν σε πολύ μεγάλο βαθμό, πρωτόγνωρο για τα Ελληνικά δεδομένα στον τομέα της Πολιτικής Προστασίας.

Αξίζουν συγχαρητήρια σε όλους σε όσους ενεπλάκησαν σε αυτήν την διαδικασία και πιο συγκεκριμένα:

Στους διοργανωτές της άσκησης, στους συμμετέχοντες στο Συντονιστικό όργανο που συγκλήθηκε στην Π.Ε. Χανίων, στους συμμετέχοντες στα πεδία δράσης από τις υπηρεσίες (Πυροσβεστική Υπηρεσία, Ελληνική Αστυνομία, Κεντρικό Λιμεναρχείο Χανίων, Ε.Κ.Α.Β, Ναύσταθμος Κρήτης, 5η Μεραρχία Κρητών, 115 Πτέρυγα Μάχης, Δημοτική Αστυνομία Δ. Χανίων και τεχνικές υπηρεσίες, Ελληνικός Ερυθρός Σταυρός (Σαμαρείτες, κ.α.), ραδιοερασιτέχνες και εθελοντές ηθοποιοί, και πολλοί άλλοι που βοήθησαν σε αυτό το έργο.

Μέλημά μας είναι η συνεχής ενημέρωση και εκπαίδευση σε θέματα που μας αφορούν όλους, θέματα πολιτικής προστασίας και έχουν να κάνουν με την προστασία, της ζωής και της περιουσίας των πολιτών, καθώς και την προστασία της πολιτιστικής μας κληρονομιάς.

(Αγώνας της Κρήτης, Σάββατο 22 και 29 Οκτωβρίου 2011)

After Turkey's Earthquake: When Will the World Wise Up About Natural Disasters?

Strong building design is key to saving lives in earthquakes

Rescue workers walk past damaged buildings in Ercis, near the city of Van, Turkey, October 24, 2011 (Caner Ozkan / Reuters)

The earthquake that tore through eastern Turkey on Oct. 23 was as inevitable as it was shocking. It was inevitable because Turkey lies in one of the world's most active seismic zones, crossed by numerous fault lines. As much as in Northern California or Japan, earthquakes are a fact of geological life in Turkey. But it was shocking because so many people — at least 279, many in the city of Ercis — died in the 7.2 temblor. It was a strong quake, but hardly a monster like the 9.0-scale disaster that hit northern Japan this spring. Yet scores of multistory buildings simply collapsed when the latest quake hit, burying hundreds of Turks.

"The buildings around us, the coffee house all went down so quickly," 42-year-old Abubekir Acar told the Associated Press. "For a while, we could not see anything — everywhere was covered in dust. Then we heard screams and pulled out anyone we could reach."

The quake was yet another reminder that the damage and death toll from a natural disaster often has much less to do with the strength of a quake or a storm than it does with the preparations — or lack thereof — among victims. For earthquakes — which still can't be predicted, and may never be — the best preparation is strong building design. Turkey is home to some sturdy, earthquake-ready architecture that's by no means the rule there. Buildings made of unreinforced brick simply pancaked, turning schools and apartment buildings into tombs. "In recent earthquakes, buildings have acted as weapons of mass destruction," the seismologist Roger Bilham of the University of Colorado wrote in a *Nature* article last year.

That's a horrifying thought, but what's really scary is that the threat from quakes like the one that struck eastern Turkey is only increasing. It's not that there's any evidence that earthquakes are becoming stronger or more frequent. Instead, it's us: global population is growing, set to pass 7 billion at the end of the month, and we're concentrating in megacities that are orders of magnitude bigger than any human settlements in the past. There are now more than 380 urban areas with at least 1 million people, and according to Bilham's work, more than 400 million people live in cities that face significant seismic risk.

Some of those cities you've heard of, like San Francisco, Los Angeles or Tokyo — all of which have suffered major quakes over the past several decades. But the great wealth of the developed nations mostly — but not always — means better building designs. San Francisco may sit near the powerful San Andreas Fault, but years of experience with quakes mean that not just buildings but citizens are as ready as they can be for the Big One. Ditto Tokyo; strict building codes in Japan kept the death toll from this spring's quake and tsunami much lower than it might have been.

The real danger is in poor but rapidly growing cities in the developing world. Much of the population growth in the next several decades will occur in South Asia and sub-Saharan Africa — and in the slums of emerging megacities. By midcentury, most of the biggest cities on the planet will be in the developing world — places like New Delhi, Dhaka or Karachi. That's a lot of poor people living in densely packed conditions that are not built for major quakes — a recipe for catastrophically high death tolls.

One way to improve resilience is simply through economic development — a richer population is in general better able to deal with disasters. But being better off isn't enough, as Turkey illustrated. And you don't have to be wealthy to be ready for a temblor. Civil engineers like Santiago Pujol of Purdue University have designed structures made of cheap materials like straw, clay and gravel that won't collapse in the event of a quake. And when buildings made of relatively light materials do collapse, they cause fewer deaths. Groups like GeoHazards International have sent seismologists and architects to help leaders in cities in the developing world shore up these and other defenses against natural disasters.

With earthquakes — as with so many other problems — we rarely give prevention enough emphasis until it's too late. That needs to change. Over the next half-century, as the world adds 2 billion or more people, it will construct as many as 1 billion housing units. Earthquakes will happen — we can't stop them. How many people will die needlessly in a temblor, however, will depend on how strong those buildings are — and that much we can control.

(Bryan Walsh / TIMEScience, Tuesday October 25, 2011)

ΕΝΔΙΑΦΕΡΟΝΤΑ - ΛΟΙΠΑ

Vibration harvester developed to power tunnel monitoring device
Trains' vibrations could provide power for monitoring tunnels

The power unit at the railway sleepers/ties in the Lotschbergbasis-tunnel in Switzerland can harvest enough energy to power wireless sensor nodes with a radio frequency interface. Image credit: M. Wischke, IMTEK

Traffic tunnels are often built in some of the most rugged and remote areas, which subjects them to extreme environmental forces while making them difficult to access. Ideally, the structural health of tunnels could be monitored in a way that requires minimal human maintenance while ensuring that the tunnels are consistently safe to drive through.

In a typical structural health monitoring system, an array of sensors placed throughout the tunnel or other structure provides continuous monitoring, giving an early warning sign of any problems, such as damage due to corrosion or impact. When batteries are used to power the sensor arrays, replacing the batteries becomes an expensive and time-consuming endeavor.

With this drawback in mind, researchers are developing a power unit that harvests the vibrations from passing traffic to power the wireless sensor nodes of a structural health monitoring system for tunnels. The power harvesting unit could reduce maintenance costs and improve the performance of the sensor network.

The researchers, Martin Wischke and coauthors from the University of Freiburg in Germany, have published their study on the new power supply concept for monitoring systems in a recent issue of Smart Materials and Structures. The study is part of the AISIS project funded by the Federal Ministry of Education and Research.

"[Currently,] railway tunnels feature very few structural health monitoring devices," Wischke told PhysOrg.com. "Our system can be easily mounted to any tunnel, whether it is a new building or an old one. The installation of the sensor nodes is quite easy, flexible, and time- and cost-effective, which are advantageous attributes compared to wired monitoring systems. Thus, our system is especially suited for refitting and upgrading older tunnels to improve security."

When the researchers first started investigating the use of vibrations from passing vehicles as an energy source, they found that no detailed data on the vibrations in traffic tunnels was available. So to begin, they investigated the vibrations in two tunnels: the Pfander-tunnel, a road traffic tunnel near Bregenz, Austria; and the Lotschbergbasis-tunnel, a high-speed train tunnel in Switzerland. They placed acceleration sensors in both tunnels to measure the vibrations from passing traffic. In the road tunnel, the sensors were monitored for a 3-5-minute period every hour, while each passing train was monitored in the train tunnel (more than 500 trains total).

When analyzing the vibrations, the researchers found that they could determine which acceleration signals represented cars and which signals represented trucks in the road tunnel. In the train tunnel, they could determine each train's structure, such as the number of axles and the wagon sizes. They could also identify passenger trains based on their smaller accelerations, which are a result of better wheels and suspensions to improve passenger comfort.

In terms of usable energy, the researchers found that only the vibrations in the train tunnel were sufficient for harvesting; vibrations at various locations along the road tunnel were too small to be useful due to vehicles' suspensions and pneumatic tires. While the vibrations in the train tunnel were strongest directly on the railroad track, the researchers decided to forego mounting a vibration harvester on the rail because screw holes pose problems, such as causing cracks. Instead, the researchers mounted vibration harvesters on the railroad sleepers/ties due to the larger space and easier access, even though the vibration amplitudes are smaller there than at the rail.

The researchers then designed, fabricated, and tested a piezoelectric vibration harvester capable of harvesting vibrations across a broad frequency, since each train produces a slightly different frequency spectrum. The energy is then stored in a capacitor and supplied to the sensor system when needed. In order to ensure safe handling of the harvested energy, the researchers designed an ultra-low power control circuit that monitors the storage capacitor voltage and disconnects the sensor circuit from the capacitor if not enough energy is available. While other power control circuits exist that consume several microwatts to operate, the new circuit's simple design enables it to run on a current of just 70 nA.

In the future, the researchers plan to make some improvements to the system, including expanding the harvested frequency spectrum and increasing the power output, and then prepare the system for industrial applications. In addition to energy harvesting, the system could be used in railway traffic surveillance, since details about the passing train (such as the quality of the wagon wheels and wagon weight) can be derived from the vibrations.

More information: M. Wischke, M. Masur, M. Kröner and P. Woias "Vibration harvesting in traffic tunnels to power wireless sensor nodes." Smart Materials and Structures Volume 20 Number 8 (2011), 085014 (8pp). DOI:10.1088/0964-1726/20/8/085014.

(Lisa Zyga / PhysOrg.com, August 8, 2011)

Atlantis hunt: a third attempt

ATLANTIS researcher Robert Sarmast has returned to Cyprus after a four-year hiatus ahead of a third expedition to try and locate the lost ancient city, he believes is underwater off Cyprus.

Sarmast said yesterday he wanted to be here for the Kataklysmos festival, or the 'festival of the flood'. This will be held islandwide next weekend.

"The Kataklysmos festival is really about the great flood that sunk Atlantis, so it's not surprising to me that the celebrations are unique to Cyprus," said Sarmast.

Sarmast's team plan to film a documentary during the Kataklysmos festival, while preparing for a third expedition.

Sarmast conducted two highly-publicised expeditions to find the remains of Atlantis in 2004 and 2006. The expedition utilised state-of-the-art deep sea equipment to survey the seafloor between Cyprus and Syria. Their attempt to prove that the legendary lost island was more than a myth was funded in part by the History Channel, private investors, and the CTO. Sarmast's theories on Cyprus are laid out in his book Discovery of Atlantis: The Startling Case for the Island of Cyprus, which was based on the writings of Plato.

"There is really a mystery within a mystery associated with this project, regarding Atlantis and the Garden of Eden, and it's time for Cypriots to know the full story," said Sarmast.

During his previous expeditions, aSonar scans of the area explored showed what Sarmast believes to be the remains of two man-made walls.

He claimed to have "definitely" found Atlantis after the sonar scans appeared to have located a rise on the seabed around a mile down in an area halfway between Cyprus and Syria.

The American researcher has been challenged by several scientists, who say all he has found are old mud volcanoes.

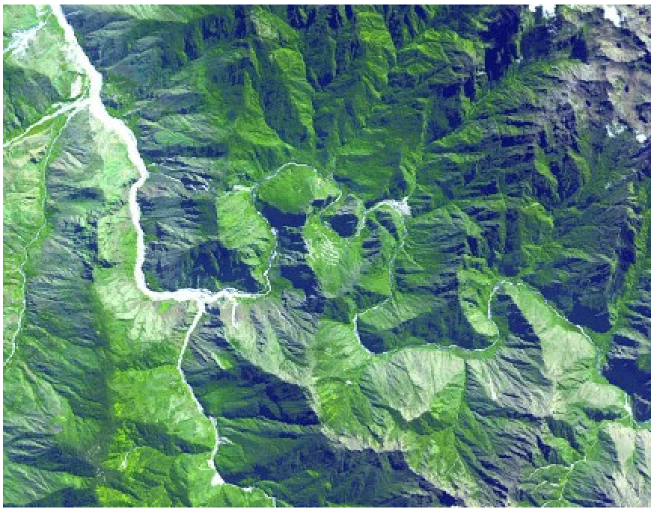
(Cyprus Mail, June 4, 2011)

Η Γη έγινε... ψηφιακή – Δημιουργήθηκε ο καλύτερος ψηφιακός χάρτης του πλανήτη

Μόνο αν αναλογιστεί κανείς ότι συνεργάστηκαν η NASA και το υπουργείο Εμπορίου και Βιομηχανίας της Ιαπωνίας μπορεί να φανταστεί τα … αποτελέσματα.

Όλοι λένε πως πρόκειται για ότι πιο τέλειο μπορεί να προσφέρει η τεχνολογία καθώς μιλάμε για τον πληρέστερο, λεπτομερέστερο ψηφιακό τοπογραφικό χάρτη του πλανήτη.

Καλύπτει με συγκλονιστική λεπτομέρεια το 99% της ξηράς, καθώς τα σημεία μέτρησης απέχουν μεταξύ τους μόλις 30 μέτρα, ενώ στις βελτιώσεις περιλαμβάνονται και εκατοντάδες χιλιάδες εικόνες, τοποθετημένες έτσι ώστε να δίνεται η εντύπωση ότι ο χάρτης είναι τρισδιάστατος.

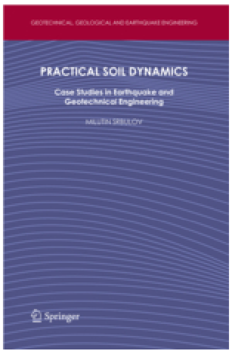


Όπως είναι φυσικό ένας τέτοιος χάρτης αλλάζει τα δεδομένα καθώς μπορεί να χρησιμοποιηθεί για σχεδιασμό αυτοκινητοδρόμων, για αναζήτηση φυσικών πόρων η απλός για… περιήγηση στον πλανήτη!

Οι χρήστες μπορούν να "κατεβάσουν" εντελώς δωρεάν την πλήρη έκδοση του χάρτη από την ιστοσελίδα της Γεωλογικής Υπηρεσίας των Ηνωμένων Πολιτειών (USGS) και να δουν … ότι και οι αστροναύτες!

(TechIT!, 20 Οκτωβρίου 2011)

ΝΕΕΣ ΕΚΔΟΣΕΙΣ ΣΤΙΣ ΓΕΩΤΕΧΝΙΚΕΣ ΕΠΙΣΤΗΜΕΣ



Practical Soil Dynamics

Case Studies in Earthquake and Geotechnical Engineering

Series: Geotechnical, Geological and Earthquake Engineering, Vol. 20

Srbulov, Milutin

The objective of this book is to fill some of the gaps in the existing engineering codes and standards related to soil dynamics, concerning issues in earthquake engineering and ground vibrations, by using formulas and hand calculators. The usefulness and accuracy of the simple analyses are demonstrated by their implementation to the case histories available in the literature. Ideally, the users of the volume will be able to comment on the analyses as well as provide more case histories of simple considerations by publishing their results in a number of international journals and conferences. The ultimate aim is to extend the existing codes and standards by adding new widely accepted analyses in engineering practice.

The following topics have been considered in this volume:

- main ground motion sources and properties
- typical ground motions, recording, ground investigations and testing
- soil properties used in simple analyses
- fast sliding in non-liquefied soil
- flow of liquefied sandy soil
- massive retaining walls
- slender retaining walls
- shallow foundations
- piled foundations
- tunnels, vertical shafts and pipelines
- ground vibration caused by industry.

(Springer, 2011)

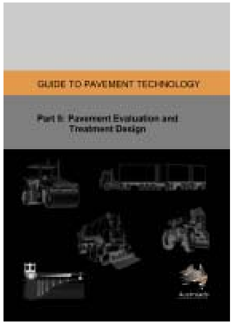
Muir Wood Lecture 2011

Tunnelling in Urban Areas and Effects on Infrastructure Advances in research and practice

Robert MAIR

In 2011, the SIr Alan Muir Wood lecture has been delivered by Prof Robert Mair on "Tunnelling in urban areas and effects on infrastructures - advances in research and practice". Follow the following link to watch the video http://www.ita-aites.org/index.php?id=849

Download the paper from the following link http://www.ita-aites.org/fileadmin/filemounts/general/pdf/ItaAssociation/ProductAndPublication/Muir_Wood_lecture/AMWLecture_2011-BD2.pdf



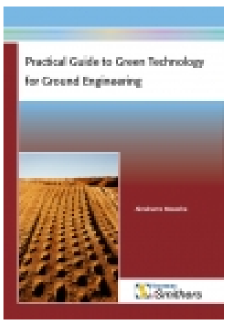
Guide to Pavement Technology Part 5: Pavement Evaluation and Treatment Design

Publication no: AGPT05-11

This publication is an update of AGPT05-09. It contains an inclusion of thickness design for stabilisation treatments, and has also been reformatted which includes realigning the contents page and the lay out to make the information more accessible for the reader.

Knowledge of pavement technology is of critical importance for all transport agencies in Australia and New Zealand. Austroads and others (e.g. state road authorities, local government, and industry) have amassed a great deal of knowledge on pavement technologies, techniques, and considerations. The purpose of the Austroads Guide to Pavement Technology is to assemble this knowledge into a single authoritative publication that is a readily available, accessible and comprehensive resource for practitioners in Australia and New Zealand. The target audience for the Austroads Guide to Pavement Technology includes all those involved with the management of roads, including industry and students seeking to learn more about the fundamental concepts, principles, issues and procedures associated with pavement technology. This Part provides advice for the investigation of existing sealed road pavements and the selection and design of pavement strategies/treatments. The advice has been generally developed from the approaches followed by Austroads member authorities. However, as it encompasses the wide range of materials and conditions found in Australia and New Zealand, some parts are broadly based. Treatment selection is related to availability of materials and knowledge of their performance in any particular locality. Part 5 covers pavement investigation, testing and evaluation, identification of causes and modes of distress and description of treatment options.

(Austroads Publications, 2011)



Practical Guide to Green Technology for Ground Engineering

Abrahams Mwasha

Over the last 50 years there has been rapid development of construction techniques, analytical methods and materials for use in ground engineering. One of the major techniques which has been developed is soil strengthening or reinforcement whereby man-made elements are included within geological material to provide a stabilised mass. Various products have been developed for retaining systems, slope stabilisation, etc.

More recently, environmental concerns and the focus on sustainable development have led to the examination of materials based on renewable resources for use in ground engineering.

In this book, the applications of both vegetable and man-made fibres in situations where there is a requirement for short-term ground reinforcement are examined and discussed. The use of vegetable fibre geotextiles (VFG), particularly in erosion control and soil reinforcement, is covered in detail, with examples from various civil engineering applications.

(iSmithers Rapra Publishing, 2011)

ΗΛΕΚΤΡΟΝΙΚΑ ΠΕΡΙΟΔΙΚΑ

www.geoengineer.org

Κυκλοφόρησαν το Τεύχος #81 του **Newsletter του Geoengineer.org** (Οκτώβριος 2011) 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).

ΩЅ ೩೦

INTERNATIONAL TUNNELLING AND UNDERGROUND SPACE ASSOCIATION
ita@news n°41
http://ita-aites.org/index.php?id=885&no_cache=1

Κυκλοφόρησε το Τεύχος No. 41 – Οκτώβριος 2011 των ita@news της International Tunnelling Association.

ΩЅ ೩೦

http://www.itacet.org/Newsletter/04_2011/newsletter_4_2011.php

Κυκλοφόρησε το Τεύχος No. 9 (Οκτώβριος 2011) του ITA-CET Foundation.

ΕΕΕΕΓΜ
Τομέας Γεωτεχνικής
ΣΧΟΛΗ ΠΟΛΙΤΙΚΩΝ ΜΗΧΑΝΙΚΩΝ
ΕΘΝΙΚΟΥ ΜΕΤΣΟΒΙΟΥ ΠΟΛΥΤΕΧΝΕΙΟΥ
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