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& ΓΕΩΤΕΧΝΙΚΗΣ
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Τα Νέα

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Θερμές Ευχές για Καλή Ανάσταση
και Καλό Πάσχα

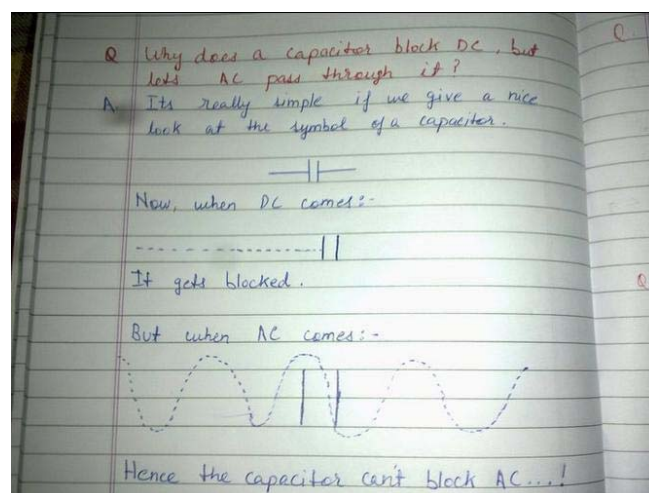
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Μιχάλης Μακρουλάκης «ΑΜΟΡΓΟΣ»
Από την έκθεση του Ιδρύματος Β. και Μ. ΘΕΟΧΑΡΑΚΗ

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Electrical Engineering!

DamWatch: New Monitoring Technology for Dam Safety

Larry W. Caldwell, Joseph P. Scannell and Noller Herbert

As storms, floods, and other large weather events can place those living near a dam at risk, proper monitoring of a dam during such events is an important aspect of dam operation and maintenance. A new technology, currently in the testing and implementation phases, may prove beneficial by equipping plant owners and operators with real-time information about a weather event and its impact on the infrastructure affected.

Technology for dam monitoring

In 2011 and 2012, the Oklahoma Natural Resources Conservation Service (NRCS) and Oklahoma Conservation Commission partnered with UEngineering Solutions Corp. of Hartford, Ct., to implement DamWatch®, a software system designed to monitor and store data for 2,107 watershed dams in Oklahoma. NRCS is funding the project as a national pilot for a web-based information system for watershed dams.

A typical watershed dam is an embankment dam that has a conduit for discharge of smaller storm flows and a vegetated earthen open spillway to convey large storm flows safely around the dam. The primary purposes of watershed dams are generally flood control, water supply and grade stabilization. The majority of these watershed dams are located on private lands that are under easements with sponsors in the watershed, usually local conservation districts. Sponsors are responsible for operation and maintenance of the dams. The dams were planned, designed and constructed with assistance from NRCS.

Although watershed dams are typically too small to support the function of hydroelectric facilities, the overarching features of the DamWatch system - including the storage and retrieval of basic design, construction and operation information; hydrologic alerts; and maintenance tracking - are directly applicable for all dams, regardless of size or purpose.

DamWatch is a web-based software monitoring system that allows sponsors, those entities responsible for operating and maintain the dams, and NRCS personnel to monitor these dams in real-time and respond to potentially destructive flood events. The system gathers and archives real-time rainfall and stream flow data from sources such as the National Oceanic and Atmospheric Administration, National Weather Service (NWS) and U.S. Geological Survey (USGS) and compares rainfall data with site-specific thresholds of dam capacity and then alerts staff of potential spillway flows at dams.

DamWatch incorporates automatic messaging that alerts users through cell phones, pagers, fax messages, e-mails or other means. Users can monitor these messages during critical flood events and dispatch staff as needed to those dams for which alerts were issued.

DamWatch also stores site-specific data, such as inspection reports, as-built drawings, operation and maintenance agreements, emergency action plans (EAP), photos and videos. These data can be accessed remotely, allowing quick interaction between on-site personnel and specialists in multiple offices.

As a result of the success of the Oklahoma pilot project, a national contract was awarded in September 2012 to US Engineering Solutions for implementation of a similar system to monitor about 11,700 watershed dams in 47 states and one U.S. territory.

USDA Watershed Program

Since 1948, NRCS has assisted project sponsors with the construction of more than 11,700 watershed dams in 47 states and one U.S. territory, with assistance from the following USDA Watershed Program authorizations: Public Law 78-534, Public Law 83-566, Pilot Watershed Program and Resource Conservation and Development.

These dams are locally operated and maintained by project sponsors with some federal assistance, which includes planning, design and construction of the dam, as well as technical assistance to investigate operation and maintenance problems and recommend solutions. Sponsors are generally local conservation districts, special-use conservancy districts or municipalities that have easements on private lands where the dams are located. In almost all cases, sponsors have non-technical personnel in charge of the operation and maintenance of the dams. Most sponsors rely on NRCS for technical assistance.

Oklahoma has been a national leader in the USDA Watershed Program since the program's inception in 1944. The state has many national-watershed firsts, including the first watershed dam built (Cloud Creek Watershed dam no. 1 near Cordell) and the first watershed dam rehabilitation (Sergeant Major Creek Watershed dam no. 2 near Cheyenne). Since 1948, 2,107 watershed dams have been built in Oklahoma (see Figure 1), more than in any other state in the nation. In 2012, more than 650 of these watershed dams reached the end of their 50-year design life, making Oklahoma watershed dams the oldest in the nation.

Typically, Oklahoma watershed dams are earthen embankment dams ranging from 20 to 80 feet high, with earthen vegetated spillways and concrete or metal-principal spillways. Most of the dams were designed primarily for flood control, grade stabilization, water supply or recreation; therefore, they typically do not store much water except for short periods immediately after large storm events. Most are in remote areas.

Dam owners and watershed program staff have compiled large numbers of records and data that provide valuable information during structural failure or large rainfall events. As-built drawings, operation and maintenance inspection reports, agreements and commitments made by sponsors and NRCS and original project work plans are all important to have on hand in case of an emergency.

Further, having access to a current EAP is critical for identifying and evacuating people downstream who are at risk when dams fail or flood. Each of the 229 high-hazard watershed dams in Oklahoma has an EAP.

From 2006 to 2010, Oklahoma NRCS staff scanned all the critical watershed records so they could be stored and accessed electronically. These records included more than 32,000 electronic files, and their size exceeded 13 gigabytes. The sheer volume of the information and ability to periodically update the information and make it available to multiple users at different locations made DVD or hard drive storage impossible. NRCS determined that a web-based software system with 24/7 accessibility would be the best way to store and retrieve the dam-safety information.

The DamWatch solution

Oklahoma NRCS developed a proposal to pilot the DamWatch system for two years. DamWatch empowers NRCS, project sponsors and emergency managers to leverage

electronically stored dam-safety data with real-time data monitoring. The system is linked to NWS and USGS real-time precipitation and stream flow data that alerts staff and emergency personnel of predetermined site-specific thresholds. Upon receipt of alerts, personnel can use the system interface (see Figure 2) to determine if preventative actions or emergency responses are needed for potentially life-threatening situations, especially those involving high-hazard dams. The system also be used to conduct mock emergency events for EAP training.

Watershed sponsors need a system that allows storage and easy retrieval of vital dam records. This is especially important as the volume of data grows and dams age, and for providing information to new employees and sponsors who are not familiar with a particular dam.

The basic engineering and program data stored in the Oklahoma DamWatch system includes:

- As-built construction drawings;
- Basic design and other data contained in the National Inventory of Dams (NID) database, maintained by the U.S. Army Corps of Engineers;
- Emergency action plans;
- Current hazard classification data;
- Breach inundation maps;
- Operation and maintenance agreements;
- Project benefits (such as flood damages prevented by the dams, wetland enhancements, wildlife habitat improvements, and so forth);
- Assessment reports;
- Watershed project work plans;
- Photos and videos;
- Dam modifications or repairs; and
- Auxiliary spillway flow history.

DamWatch enables 24/7 real-time access to this information via the web by project sponsors, NRCS employees and emergency managers and other authorized users, as opposed to only those with the ability to get to an office and file cabinet drawers.

The DamWatch program uses geographical information system (GIS) technology to display a dam's location and drainage area. This system can collect and process any real-time data at regular intervals. These data can be compared against predetermined thresholds to alert essential personnel when a dam is experiencing a critical precipitation event.

The amounts of precipitation at specific locations can vary significantly when such an event occurs in an area where there are numerous watershed dams. Using NWS radar data, DamWatch can determine which dams have received the heaviest rainfall within a drainage basin and thus have the highest probability of spillway flow. This information allows project sponsors and NRCS to prioritize field inspections of the most critical dams first and allocate resources efficiently and cost-effectively. As DamWatch allows sponsors to concentrate on dams that received the highest amount of rainfall and thus the greatest need for attention, it saves time and money by avoiding the need to send staff to the lesser risk dams.

Users can remotely access DamWatch anywhere using any web-enabled device. In Oklahoma, six Motorola Xoom tablet computers were selected to test the ability of users to access DamWatch in the field. The tablets enabled personnel to remotely interact with the system to document activities, upload pictures or view online files. Each tablet had the capability to receive alerts, view online files, take photos and videos, and even video chat with other active field personnel.

Alert thresholds

The goal of establishing alert thresholds for DamWatch is to provide timely notice to users of possible or impending auxiliary spillway flows with special attention given to high-hazard dams. The storm rainfall amount (the estimated accumulated rainfall, continuously updated, since the last one-hour break in precipitation) detected by the NWS' Next-Generation Radar (NexRad) system, a network of 159 high-resolution S-band Doppler weather radars operated by the National Weather Service, is compared to the threshold amount establish for each dam. If an established threshold is exceeded in DamWatch, the system will issue a NexRad alert for that dam.

DamWatch uses a specific methodology to establish these thresholds. The designed-detention storage volume for each dam (as shown in the NID) is converted to watershed inches. The rainfall in the dam's drainage area needed to produce the runoff to fill the designed-detention storage volume is estimated using the project work plan runoff curve number. Two precipitation threshold levels are established for each dam, and each has a corresponding message in the alert to describe the situation, whether a rainfall alert or a spillway-flow alert.

Here is an example of an initial alert message from DamWatch:

NID ID: OK0008
Dam Name: Stillwater Creek No. 26
County: Payne
Closest Town: Stillwater
Distance from closest town: 1 mile
Design hazard: L
Current hazard: H
Rainfall Alert event
Time: Wed Jul 14 14:04 CDT 2010
Exceeding Threshold: 7.2 inches
Data Source: Twelve Hour (KICT)

There are some exceptions to this methodology. Multi-purpose dams may have much greater available detention storage if they were built for municipal water supply, recreation, or irrigation. This storage may not be fully used: this provides additional detention storage at the time of the storm. The methodology does not account for principal spillway discharge during a storm. Most times this will be minimal. Exceptions include: designed full-flow grade stabilization structures or dams with large principal spillway conduits. The methodology also does not capture situations where storms occur over several days. A revised methodology needs to be developed in the future to estimate principal-spillway discharge during the storm to deduct from estimated runoff value.

Expanded use and impact

The Oklahoma NRCS DamWatch system pilot proved to be a tremendous tool. It provided all the critical information needed during emergencies, as well as in normal day-to-day operation of dams.

During the summer of 2012, the NRCS national staff leadership decided to implement a dam-monitoring system for the 11,700 watershed dams in 47 states and one territory. NRCS issued a national solicitation in July 2012 for a competitive fixed-price, US\$50,000 contract. USEngineering Solutions was awarded the contract in September 2012. The contract term is one year, with four additional option years. The implementation period extends for six months after contract award.

This is a tremendous effort to implement a national system, gather the watershed data, load it into the software, train users and provide an operational system nationwide. The

national system is now in the formative stages of implementation. By late spring 2013, the nationwide system is expected to be operational with all users trained and using the system by fall 2013.

While NRCS is not currently involved in any hydroelectric projects, the features of the DamWatch system are applicable to all dams, including those with hydroelectric turbines and powerhouses. Further, there have been discussions with owners of Federal Energy Regulatory Commission-licensed hydroelectric projects to use DamWatch for more effective operation and management of their dams.

Larry Caldwell, an engineer at the Oklahoma Conservation Commission, has led implementation of the Oklahoma DamWatch pilot project. Joseph Scannell, president of USEngineering Solutions Corp., is responsible for adapting the design of the DamWatch system for specific projects. Noller Herbert, director of the Conservation Engineering Division of the U.S. Department of Agriculture's Natural Resources Conservation Service, is responsible for leadership of the implementation of DamWatch for the USDA Watershed Program.

(Hydro Review, 1st March 2013,
<http://www.hydroworld.com/articles/hr/print/volume-32/issue-2/articles/damwatch--new-monitoring-technology-for-dam-safety.html>)

ASCE gives America's dams "D" grade

A report released by the American Society of Civil Engineers (ASCE) gives America's dams an overall grade of D.

The study -- called the 2013 Report Card for America's Infrastructure (<http://www.infrastructurereportcard.org/>) -- is an analysis published by ASCE every four years.

The document "depicts the condition and performance of the nation's infrastructure in the familiar form of a school report card", ASCE said, and includes grades for 16 different categories (<http://www.infrastructurereportcard.org/a/#p/home>).

America's cumulative infrastructure "GPA" is a D+ with US\$3.6 trillion of investments needed by 2020, the report said.

Regarding dams, the average age of the 84,000 dams in the U.S. is 52 years old, the report card said.

"The nation's dams are aging and the number of high-hazard dams is on the rise," ASCE said. "Many of these dams were built as low-hazard dams protecting undeveloped agricultural land. However, with an increasing population and greater development below dams, the overall number of high-hazard dams continues to increase."

According to ASCE, dams fitting the "high-hazard" category numbered nearly 14,000 in 2012, with 4,000 qualifying as "deficient".

Repairs to these high-hazard dams would require a \$21 billion investment, ASCE said.

As the study notes, the vast majority of America's dams are not regulated by the federal government, but instead rely on state dam safety programs for inspection. Many state programs lack sufficient resources and regulatory authority, however, leading ASCE to suggest the implementation of more national programs as a means of alleviating the problem.

To view ASCE's dams report card in full, click here (<http://www.infrastructurereportcard.org/a/#p/dams/overview>).

Dams 2013 Grade D



A = Exceptional, B = Good, C = Mediocre, D = Poor, F = Failing

The average age of the 84,000 dams in the country is 52 years old. The nation's dams are aging and the number of high-hazard dams is on the rise. Many of these dams were built as low-hazard dams protecting undeveloped agricultural land. However, with an increasing population and greater development below dams, the overall number of high-hazard dams continues to increase, to nearly 14,000 in 2012. The number of deficient dams is estimated at more than 4,000, which includes 2,000 deficient high-hazard dams. The Association of State Dam Safety Officials estimates that it will require an investment of \$21 billion to repair these aging, yet critical, high-hazard dams.

Dams: Conditions & Capacity

Our nation's dams provide essential benefits such as drinking water, irrigation, hydropower, flood control, and recreation. The safe operation and proper maintenance of these dams is critical to sustaining these benefits while preventing the possibility of a dam failure. Thousands of our nation's dams are in need of rehabilitation to meet current design and safety standards. They are not only aging, but are subject to stricter criteria as a result of increased downstream development and advancing scientific knowledge predicting flooding, earthquakes, and dam failures.



Crab Orchard Dam, Illinois

Dams are classified based on their hazard potential, or anticipated consequences in the case of failure. The failure of a dam that is classified as **high-hazard** is anticipated to cause a loss of life. As of 2012, there are 13,991 dams in the United States that are classified as high-hazard, showing a continued increase in the overall number of dams with that classification. The number has increased from 10,118 high-hazard dams just ten years ago. Another 12,662 dams are currently labeled as **significant hazard**, meaning a failure would not necessarily cause a loss of life, but could result in significant economic losses.

The average age of our nation's dams is 52 years. By 2020, 70% of the total dams in the United States will be over 50 years old. Fifty years ago dams were built with the best engineering and construction standards of the time. However, as the scientific and engineering data have improved, many dams are not expected to safely withstand current predictions regarding large floods and earthquakes. In addition, many of these dams were initially constructed using less-stringent design criteria for low-hazard dams due to the lack of development below the dam.

The U.S. Census Bureau estimates a population increase of 130 million people within the United States by 2050. This population growth will likely move development further into the unpopulated areas below aging dams, increasing the populations at risk and reclassifying many low or significant hazard dams as high-hazard. However, "high-hazard" does not necessarily mean the dam is deficient, but instead that the consequences are expected to include loss of life should the dam fail.

Dam failures can not only risk public safety, but they can cost our economy millions of dollars in damages. For example, the Iowa Lake Delhi dam failure in 2010 cost an estimated \$50 million in damages and \$120 million in economic losses, and swept away half a dozen homes. Since dam failures can cause severe consequences to public safety and the economy, emergency action plans (EAPs) for use in the event of an impending dam failure or other uncontrolled release of water remain vital. While the number of high-hazard dams with an EAP has increased, only 66% of dams have EAPs, far below the national goal of 100%.

The complexity of monitoring the conditions of our nation's dams is partly because they are owned and operated by many different entities. While some of the nation's dams

are owned and operated by federal, state, and local governments, the majority, 69%, are owned by a private entity. The federal government owns 3,225 dams, or approximately 4% of the nation's dams. It may be surprising to some that the U.S. Army Corps of Engineers owns only 694 dams.

Other than 2,600 dams regulated by the Federal Energy Regulatory Commission, the remaining dams in the nation are not regulated by the federal government, but instead rely on state dam safety programs for inspection. State dam safety programs have primary responsibility and permitting, inspection, and enforcement authority for 80% of the nation's dams. Therefore, state dam safety programs bear a large responsibility for public safety, but unfortunately, many state programs lack sufficient resources, and in some cases enough regulatory authority, to be effective. In fact, the average number of dams per state safety inspector totals 207. In South Carolina, just one and a half dam safety inspectors are responsible for the 2,380 dams that are spread throughout the state. Alabama remains the only state without a dam safety regulatory program.

Dams: Investment & Funding

The federal National Dam Safety program, which provides grants to states to improve programs through training, technical assistance, inspection, and research, expired in September 2011. This program, administered by the Federal Emergency Management Agency (FEMA), is dedicated to protecting the lives of American citizens and their property from the risks associated with the failure or misoperation of America's dams. Additionally, a national dam rehabilitation and repair program, which would fund the repair, removal, or rehabilitation of the nation's publicly owned, nonfederal, high-hazard dams, still has not been established.



Water flows over the Devils Kitchen Dam in southern Illinois

Funding needs are significant, and vary according to who owns and operates the dam. The Association of State Dam Safety Officials estimates that the total cost to rehabilitate the nation's non-federal and federal dams is over \$57 billion. To rehabilitate just those dams categorized as most critical, or high-hazard, would cost the nation \$21 billion, a cost that continues to rise as maintenance, repair, and rehabilitation are delayed. Overall, state dam safety program staffing has increased over the past several years. However, in 2011 state programs spent over \$44 million on their regulatory programs, a decrease from recent years.

The U.S. Army Corps of Engineers estimates that more than \$25 billion will be required to address dam deficiencies for Corps-owned dams. At current investment rates, these repairs would take over 50 years to complete. The Bureau of Reclamation has identified approximately 20 of its high and significant hazard dams where risk reduction actions are justified. The cost of those actions is estimated at \$2 billion over the next 15 years.

The dam safety engineering practice is moving towards a risk-based decision-making process for the design, rehabili-

tation, and operation of dams. Risk-based decisions enable the dam owner to better utilize limited funding, and prioritize projects, by focusing on repairs and operational changes that reduce risk to acceptable levels, thus improving community resilience. Engineers, dam owners, regulators, and emergency management professionals should be engaging those communities affected by a dam failure, in order to provide a fair portrayal of risk. Through broader community collaboration, stakeholders will be better able to support land use decisions, emergency action planning, and maintenance and rehabilitation funding, which will reduce community risk in the long term.

Dams: Success Stories

Big Hole River Diversion Dam Replacement

The Big Hole River Diversion Dam was originally built in the late 1890s to meet the needs of the local copper mines. By 2009 the dam's intake structure was outdated and structurally failing, threatening the main water source for the city of Butte, Montana, if the dam should fail. With more frequent emergency repairs, increasing public safety concerns for the river's recreational users, and the fish passage being restricted, it was decided that a replacement project was necessary.



The Big Hole River Diversion Dam

The old structure was removed and replaced with a new concrete intake structure and a new rock weir. The new intake structure now provides a more reliable water flow from the river to the existing pump house. The newly constructed dam also took into account recreational use and boater safety, creating a boat and fish passage channel. Most importantly, the dam has provided Butte the security of drawing water from the Big Hole River for years to come.

Living with Dams: Know Your Risks

There are over 84,000 dams scattered across the country, and most people are not aware of their existence, nor of what to do if there is a problem. The National Dam Program recognizes the vital role that public awareness plays regarding dam safety and has been working to increase public awareness surrounding dams.

The Association of State Dam Safety Officials teamed up with FEMA to produce *Living with Dams: Know Your Risks* (<http://www.livingneardams.org>). The booklet was created to help answer questions about dams: what purposes they serve, associated risks, guidance for those living near dams, and where to find further information.

Printed copies of the booklet were distributed by FEMA, for the first time, at the National Dam Safety Awareness Day activities on May 31, 2012. Since then, copies have been distributed across the country, raising public awareness of this hidden infrastructure.

Dams: Conclusion

As our nation's dams continue to age and the size of the

population protected by dams continues to increase, more people downstream are at a potential risk. Many state dam safety programs are operating with limited resources and authority, thereby reducing critical inspections and regulatory actions necessary to maintain the safety of dams. Additionally, the number of dams needing repair continues to grow, while the funding required also increases over time. Some modest gains have been realized by increasing the number of emergency action plans for high-hazard dams and completing some dam safety repairs; however, a significant commitment from the federal, state, local, and private sector to America's dams is long overdue.

Raising the Grades: Solutions that Work Now

- **Reauthorize the National Dam Safety Program** by 2014 and fully fund the program for each year under the reauthorization.
- **Establish a national dam rehabilitation and repair funding program** to cost share repairs to publicly owned, nonfederal, high-hazard dams.
- **Develop emergency action plans** for every high-hazard dam by 2017.
- **Implement a national public awareness campaign** to educate individuals on the location and condition of dams in their area.
- **Encourage incentives to governors and state legislatures** to provide sufficient resources and regulatory authorities to their dam safety programs.
- **Require federal agencies that own, operate or regulate dams to meet the standards** of Federal Guidelines for Dam Safety.

(ASCE, 27 March 2013)

Off-world economy



There are thousands of near-Earth asteroids (NEAs) made from substantial amounts of metal and water.

Mining asteroids for resources to sustain a space-based economy is a scenario taken straight from the pages of numerous science-fiction stories set in the distant future. But several companies are hoping to literally launch this new industry within the next decade.

We put your questions on just how such a grand plan might become a viable commercial reality to a panel of experts:

Ian Crawford, professor of planetary science and astrobiology at Birkbeck, University of London, an expert on space exploration who has helped develop instruments to look for minerals on the moon.

David Gump, CEO of Deep Space Industries (DSI), a US firm hoping to launch several small spacecraft to look for suitable asteroids and developing microgravity manufacturing technologies.

Chris Lewicki, president and chief engineer of Planetary Resources, another US firm whose investors include Google bosses Larry Page, Eric Schmidt and film director James Cameron, and which is developing a space telescope, the Arkyd 100, to seek prospective asteroids to mine.

Sara Seager, professor of planetary science and physics at the Massachusetts Institute of Technology (MIT), an expert on planets outside our solar system who has advised Planetary Resources.

What evidence is there for large enough extra-terrestrial mineral deposits to make space mining a realistic proposition?

Prof Sara Seager, MIT: The evidence is in the small asteroids or pieces of asteroids that fall to Earth as meteorites. Tens of thousands of meteorites have been collected and studied in sophisticated detail. Planetary scientists therefore know, in general, what asteroids are made of and that asteroids contain valuable metals.

Chris Lewicki, Planetary Resources: We've been able to connect our knowledge of the meteorite population to more modern things such as telescopic observations and taking spectra of these objects, and things such as radars that tell you even more about properties of ones that cross very close to the Earth. In the best case we've had several missions now that have gone to asteroids, taken up-close measurements and in one case even returned samples from them. All that says that there are really a lot of these resources out there. It's an excellent amount of information to be starting our kind of business from.

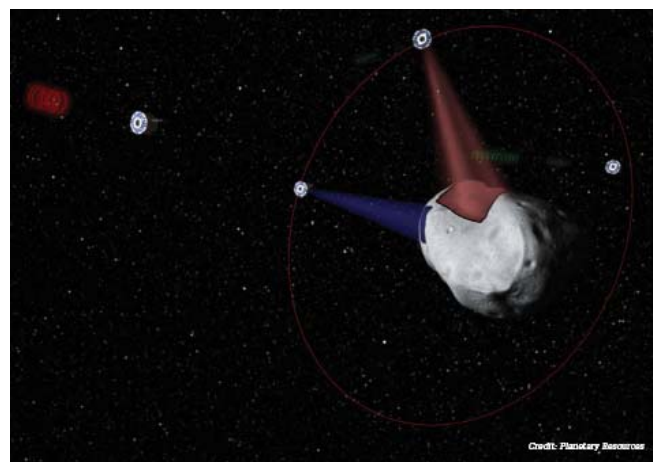
David Gump, DSI: The very idea of mineral deposits is based on familiar (and largely irrelevant) experience on Earth, where cyclic geochemical extraction and concentration processes produce small, highly concentrated ore de-

posits in the Earth's crust. But asteroids are mostly undifferentiated bodies that have never separated into core, mantle and crust. For this reason, there is no need to seek out mineral deposits because the entire body is an ore.

How can you determine which asteroids would be worth exploiting?

Prof Ian Crawford, Birkbeck: Information on the chemical composition of asteroids is obtained mainly from their optical and infrared spectra. Quite large telescopes are required to obtain spectra of the smallest objects because they are so faint, and the establishment of observatories dedicated to NEA detection and characterisation would greatly assist in creating an inventory of economically exploitable asteroids in near-Earth orbits. Metallic asteroids may additionally be detected from their very strong reflectance of radar signals transmitted towards them.

SS: The most relevant factor is "orbital economics": which asteroids are easiest and hence most cost-effective to reach with a spacecraft and to land on and take off from. Of particular interest are asteroids with a low velocity relative to Earth and low surface gravity. Near-Earth asteroids (NEAs) numbering in the several thousands are the most accessible as they cross Earth's orbit and can come close to Earth. Ideally we would like to know in advance what the interior of a prospective asteroid is made of. In practice we can't precisely connect the exterior (as observed by telescopes) to the interior composition because of a surface layer of dust and space weathering. The ultimate goal to link an asteroid to meteorites recovered on Earth has remained elusive, hence a concept of deploying many autonomous small spacecraft which could land on candidate asteroids and determine their interior composition before sending out a fleet of mining-capable spacecraft. In the meantime we can classify some asteroids as metal-rich and those would be the place to start.



Swarms of prospecting spacecraft could enable companies to identify the most valuable asteroids for mining.

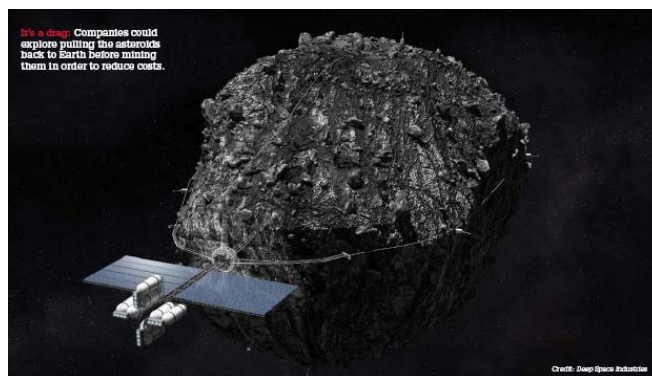
What minerals are valuable enough to make this worthwhile?

IC: Metallic asteroids consist of essentially pure nickel-iron alloy. Although Earth has significant reserves of both these elements, and extra-terrestrial sources of them will probably not be required for the foreseeable future, such asteroids also contain several hundred parts per million of gold and platinum-group metals (PGMs). As a result, it has been estimated that a single small metallic asteroid about 200m across could be worth \$30bn dollars at today's prices. Other types of asteroids offer potentially exploitable materials. Carbonaceous chondrites (which make up 10-15 per cent of the NEA population) are relatively rich in volatiles. While probably not of significant value to the Earth's economy, these could nevertheless be of great value to a future space

economy, by providing water, hydrogen, and oxygen for use by future human and robotic space missions without the need to haul these materials out of Earth's gravity.

CL: There's a valuation that a 500m-diameter asteroid that's platinum-rich actually has as much platinum in it as has been mined in the history of mining. And the platinum-group metals are materials that we're designing out of things because they're so expensive: \$1,600 an ounce. But for us, the material is valuable not just because it's scarce here on Earth but because it is an incredibly useful element. It has wonderful catalytic properties, it's used for high-temperature crucibles etc. Aluminium used to be one of the rarest metals that we knew in the 1800s and today it is ubiquitous. So we'd like to be able to help create that transition for the platinum group elements.

DG: We believe that PGMs will only ever be profitable as byproducts from refining of asteroidal regolith, after a mature industry has developed. We believe gold is a non-starter. And, to quote a very old bit of mining industry advice, the very first thing you need to know about rare earth elements, is that they are not rare. Certain carbonaceous chondrite meteorites show assay values in the order of 10 per cent water, 10 per cent reduced metal and five per cent metal sulphides. IF we can recover such material from chosen target asteroids, bring it to high Earth orbit, and refine it to directly useful feedstock (fuel, metal sheet, etc.) then that recovered asteroidal material has an imputed value of \$1,000,000 per ton. Such material might characteristically also contain 50 parts per million PGMs, which can readily be calculated to be worth something like \$2,000 per ton when returned to Earth. The key question now on retrieval missions is the subject of our ongoing review: 'how small can you go to get started and still make money?'



It's a drag: Companies could explore pulling the asteroids back to Earth before mining them in order to reduce costs.

The costs involved with space mining are going to be huge. What sort of value proposition could possibly make this feasible?

CL: While the costs might be quite large, the value that we'll be getting we anticipate is much larger. Similar industries have been started and similarly audacious things have been done over the timescale of human exploration on this planet. A good example is offshore oil exploration. Shell, in the early 1980s, bet \$1bn of its own capital to acquire oil through a mile of open ocean and another mile or two of earth underneath that water. That's something that it has put several more billions of dollars into since but it does it because it's making many times that amount. And the oil industry didn't have the history of expensive government projects to precede them.

DG: Actually, it is the cost of terrestrial mining that is huge, with major projects often requiring tens of billions of dollars to bring on line. Initially, asteroid mining will be more of a boutique operation, producing very high-value products in modest quantities for in-space markets. The high-grade ore

in a tiny five-metre asteroid is worth \$200m to \$500m. The first one returned should more than pay back the development and launch costs required to retrieve and process it. The 'value proposition' is that a developing in-space economy will seek to access useful resources from space rather than from Earth so as to avoid some fraction of the presently massive Earth-launch cost, which now ranges between \$10,000/kg and \$40,000/kg.

What mining process do you think would be most effective for gathering materials from asteroids?

DG: Asteroids come in several basic types. For a rubble pile of loosely held gravels and boulders, the steel metal grains can be collected with a magnet skimming the surface. Alternatively, we may use scoops, augers and active grabs to gather surface materials. The carbonaceous meteorites are mostly composed of water-bearing clay minerals and magnetite loosely stuck together by organic polymers ("plastics"). A magnet can also pick them up. Dormant comets likely have an outer layer of dust covering a weakly competent bituminous roadbase layer around a core of volatiles, silicates and carbonaceous materials (the "icy mudball"). Drilling, "moles" and other techniques are being considered to reach the core of dormant comets. Thus only some objects have buried layers that need to be accessed using terrestrial techniques. Material gathered at asteroids will be far richer than terrestrial ores, so beneficiation and refining processes will be different. Processes appropriate for low gravity and a good vacuum are relevant to asteroids, but most have no counterpart on Earth.

How much of the technology that you would need for space mining exists in some form already and in what additional areas would you need to develop new capabilities?

SS: Technology already exists for spacecraft to travel to an asteroid, get into an orbit around an asteroid, land on an asteroid and touch down for sample return. [But] while much technology exists, we now have the tremendous task to enable a much faster and cheaper process. Even more significant is developing a cost-efficient asteroid mining process, one that works robotically in microgravity.

DG: Many of the techniques we need for asteroid mining and processing are far more rudimentary than those needed to extract useful products from ores on Earth. We rely heavily on basic physics and chemistry with which we are already very familiar and in which we have hundreds of years of practical experience. Of course we will learn as we go, and novel extraction and processing techniques appropriate to particular asteroids will develop as needed.

Of crucial importance is the need for robustness and essentially zero maintenance. Mining-machine autonomous control, with only high-level human input, will be important due to the round-trip signal latency of possibly tens of minutes. Very significant advances in mining-machine automation and autonomous control have been achieved over the last few years. We will certainly need advances in machine AI and are in conversations with developers in these areas.

Do you envisage the material being returned to Earth in its raw form or would it more likely be refined and used for manufacturing in space, and why?

CL: I think the vast majority of it will be used in space and, much like we mine and refine materials on Earth, you do as much as you can near the site of the mine. There are transportation costs in space just as there are transportation costs on Earth, so if we are dealing with structural metals we'll want to have reasonably pure metals before we start moving them around. And one of the reasons that water and volatiles are so early in our roadmap is that it is relatively easy to get to near 100 per cent purity in that

particular resource, so you're just shipping the stuff that matters.

DG: The value of water and metals from asteroids is highest in geosynchronous orbit and beyond, due to launch costs. Water or metal in high orbit is worth \$17m/ton; brought back to Earth, steel sells for \$700/ton.

The easiest-to-reach asteroids, in terms of energy required, generally take the longest for their orbits to match up again with that of Earth - as much as 20–50 years. Waiting decades for a mining operation to pass by Earth again isn't practical. We therefore will bring back small asteroids in the five to 10-metre range to a parking orbit near Earth, such as around the moon or to an Earth-moon Lagrange point. These will mass 200 to 1,500 tons, providing plenty of high-grade ore to process.



Microproblem: Relatively simple mining techniques could be used to harvest asteroids if they were adapted for microgravity.

Within what timescale do you realistically think viable space mining operations could be established?

DG: DSI will launch prospecting spacecraft in late 2015 and will likely launch retrieval missions in 2019–20 that deliver commercial quantities of ore back to Earth's orbit by 2021–22. Therefore, within a decade, DSI will be producing asteroid-derived water, propellant and 2015 with 25kg FireFly spacecraft that perform asteroid fly-bys. Then slightly larger DragonFlies upgrade the prospecting campaign with the ability to acquire 25–50kg samples and return them to Earth for detailed analysis of their value. The first sample should be on its way back to the home planet in 2017. The retrieval phase requires a large Harvester spacecraft with 40–100kW of solar-electric power to feed its ion engines for a two- to three-year round trip starting in 2019–20. In parallel, DSI will continue developing the processing technologies that we will launch into orbit to meet the first returning Harvester.

CL: We are building our business to make money from day one and we've actually been successful in doing that in that many of the technologies that we're developing to prospect and develop asteroid resources are technologies that are useful to people today in commercial markets and in government research. Having said that, we are aggressively working on the prospecting task and we'll be putting our first spacecraft for remote sensing of asteroids up in early 2015 and maybe even some technology demos prior to that. Within a few years after that we've got our sights set on a number of near-Earth asteroid targets that we'd like to start to survey, with the goal at the beginning of the next decade of extracting our first small amounts of water and scaling that up.

What advice would you give to engineers interested in getting involved in this nascent industry?

DG: First read Mining the Sky by John S. Lewis and sign up to receive DSI announcements and newsletters. Then begin considering how your specialty would be differently applied in space. In the absence of gravity, materials stayed mixed even with different densities — metal alloys impossible on the ground can be achieved in orbit, oil and water do mix, etc. New resources available to space engineers include the highest-quality vacuum at no cost. Solar power is reliable, available 24/7. Solutions to many problems will be different in space and there will be opportunities that require innovative thinking to realise.

(theengineer / April 2013, pp. 28-31)



**SYNER-G: Systemic Seismic Vulnerability and Risk
Analysis for Buildings, Lifeline Networks and Infra-
structures Safety Gain**

**Coordinator: Prof. Kyriazis Pitilakis,
Aristotle University of Thessaloniki**
www.syner-g.eu

SYNER-G developed an innovative methodological framework for the assessment of physical as well as socio-economic seismic vulnerability at the urban/regional level. The built environment is modeled according to a detailed **taxonomy** into its component systems, grouped into the following categories: buildings, transportation and utility networks, and critical facilities. Each category may have several types of components. The framework encompasses in an integrated fashion all aspects in the chain, from regional **hazard** to **fragility** assessment of components to the **socioeconomic impacts** of an earthquake, accounting for all relevant **uncertainties** within an efficient quantitative simulation scheme, and **modeling interactions** between the multiple component systems in the taxonomy. The layout of SYNER-G methodology and software tools is illustrated in Fig. 1. The **prototype software** (OOFIMS) is implemented in the **SYNER-G platform**, which also provides several tools for pre and post-processing (Fig. 2).

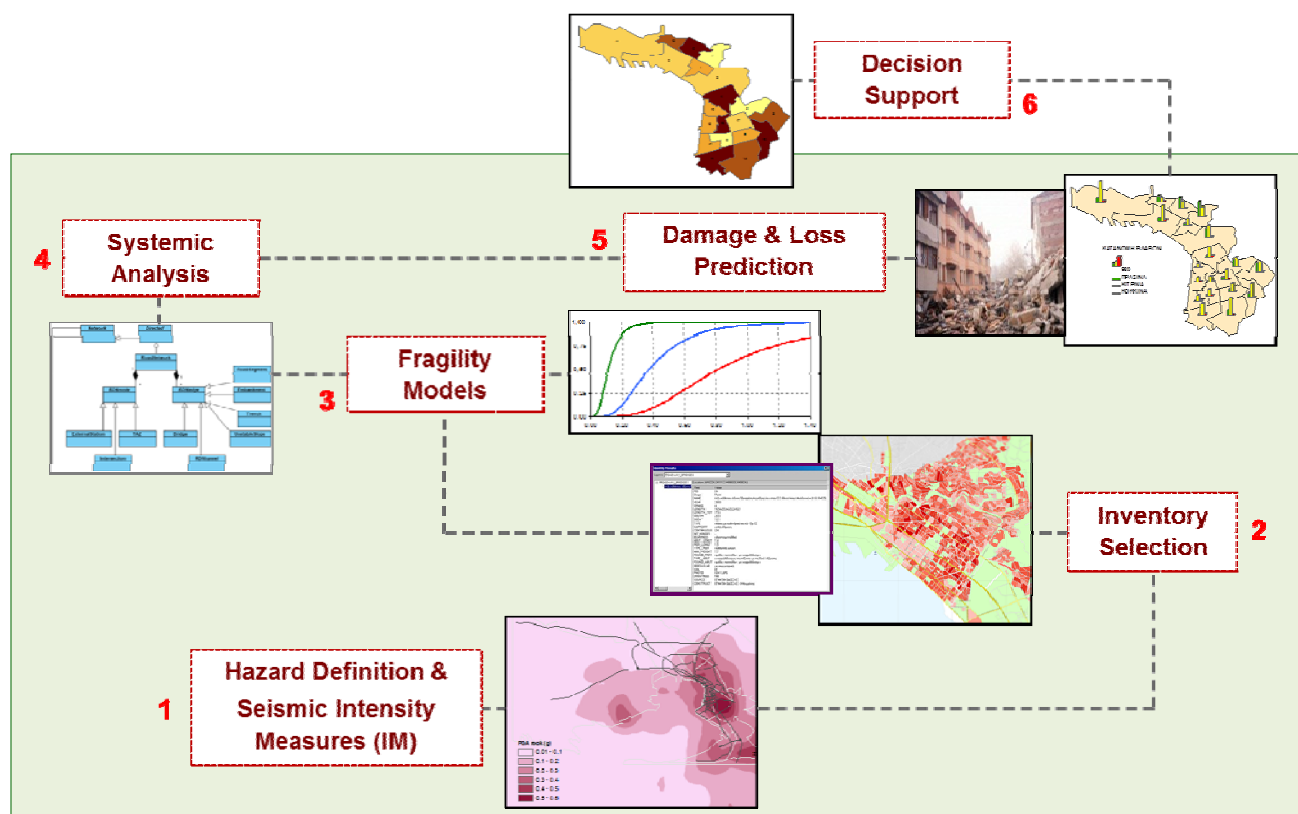
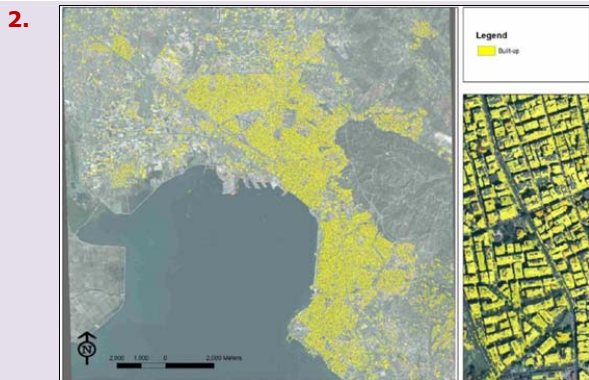
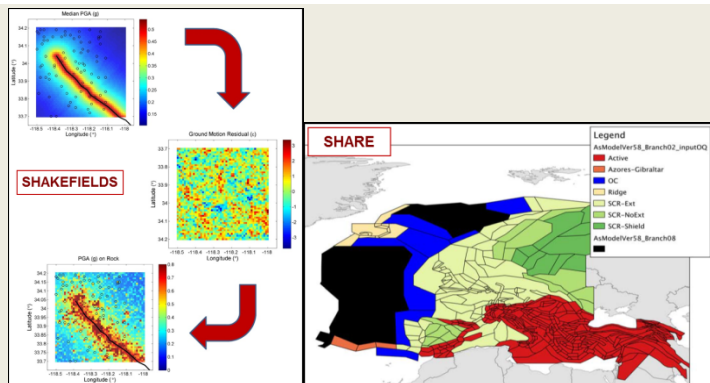


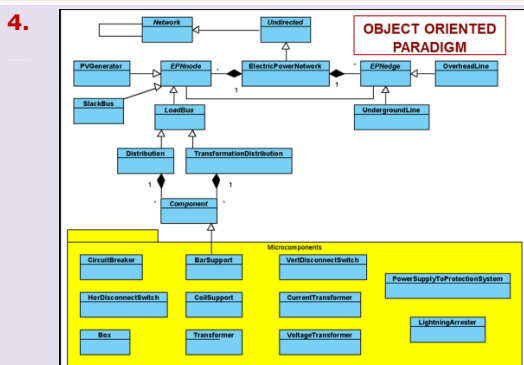
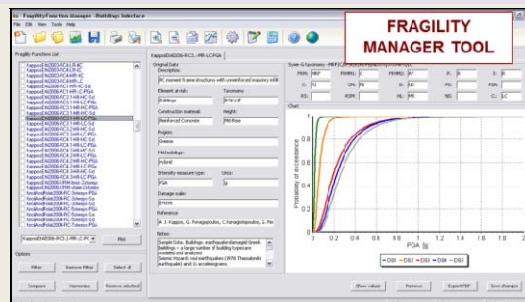
Fig. 1 Layout of SYNER-G Methodology & Software tools

1. The **seismic hazard** is defined based on the SHARE EC/FP7 project results. A stochastic simulation is performed for the generation of spatially correlated and cross-correlated fields for ground motion intensity measures (Shake-fields). Site effects and various geotechnical hazards (liquefaction, fault crossing, landslide displacements) are also considered.



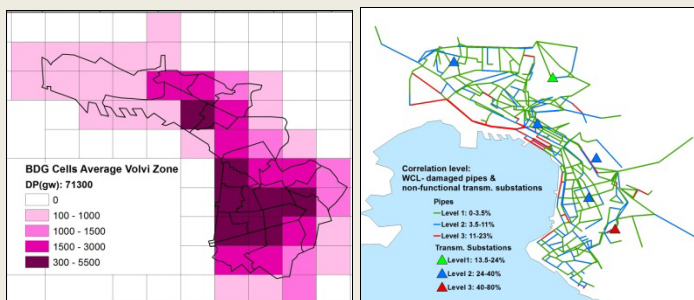
The physical elements are the built environment (buildings, lifeline networks, transportation infrastructures, critical facilities) while the social elements are represented by the demographic and socio-economic data. It is essential to compile **inventory** databases of elements at risk and to make a classification on the basis of pre-defined typology definitions. Inventories are obtained from Census Data, Owner/Operators Data, and ground surveys or through remote sensing techniques. Unified and harmonized **typology and taxonomy** definitions are proposed for the European physical assets at risk.

3. **Fragility curves** based on SYNER-G taxonomy are selected, developed and proposed for all elements at risk. A **Fragility Function Manager Tool** is available for the storage, harmonization and comparison of all available fragility functions.

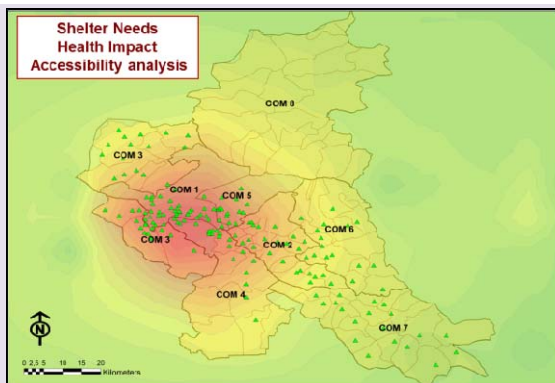


A **systemic analysis** methodology and tool is developed for buildings (BDG), utilities and lifelines (electrical power, water, waste water, gas, transportation and harbor networks and health care facilities). The **Object-Oriented Modeling paradigm** is used, where the problem is decomposed in a number of interacting objects. Each system is specified with its components, solving algorithms – interactions between components, performance indicators (PIs) and interactions with other systems.

5. An advanced innovative systemic vulnerability assessment is carried out considering uncertainties based on Monte Carlo or importance sampling simulation. **Damages and losses** for all assets are assessed. Representative results are building damages, casualties (deaths, injuries, displaced people), connectivity or flow analysis-based performance indicators for networks and infrastructures and mean annual frequency of exceedance of the Pis. Distribution of estimated damages and losses for specific events is given through thematic maps.



6.



Socio-economic losses are assessed including **shelter needs, health impact and accessibility models**. A Multi-criteria Decision Analysis tool is applied, which provides decision makers with a dynamic **decision-support platform** to capture post-disaster emergency shelter demand decisions. Apart from building and utility losses, building usability, building habitability and social vulnerability of the affected population together with socio-economic indicators (Urban Audit/EUROSTAT) are considered in the analysis.

SYNER-G platform

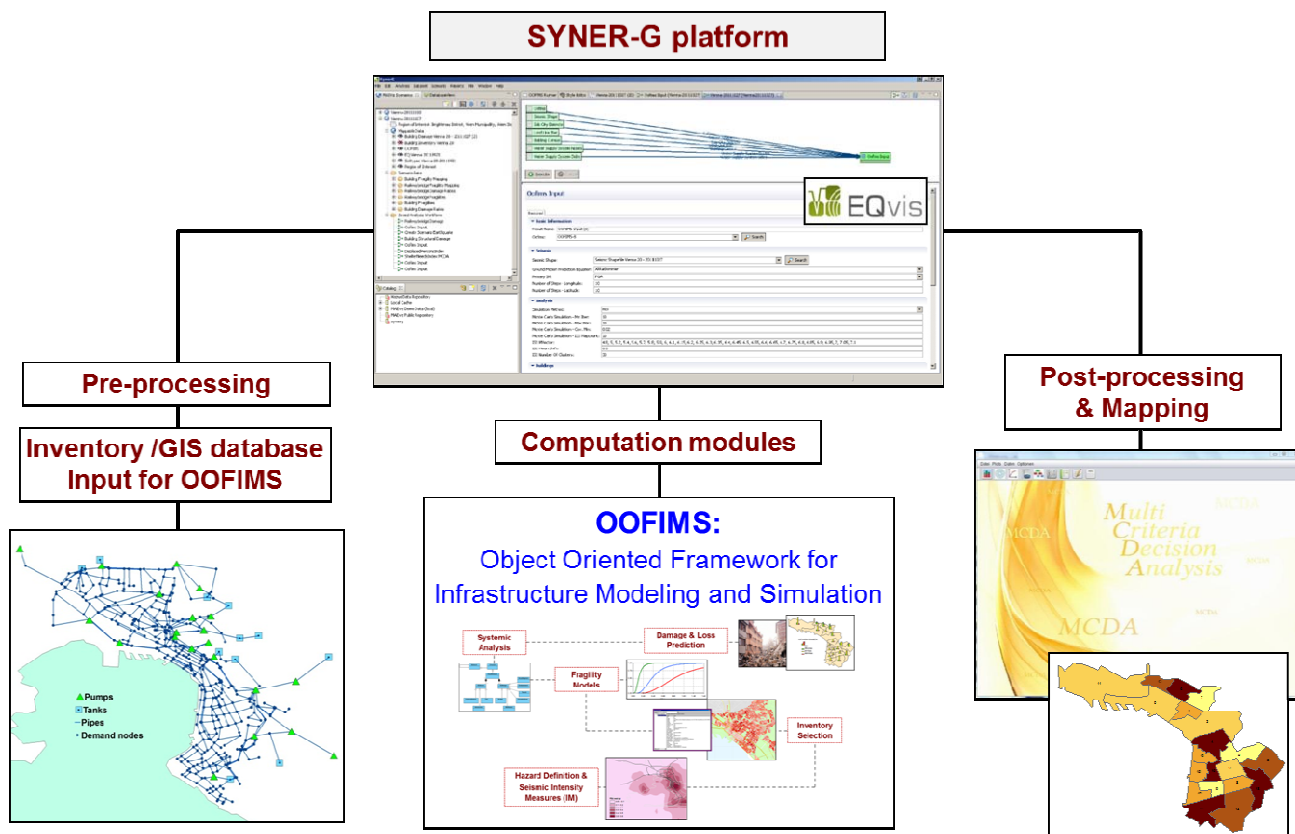


Fig. 2. Layout of the SYNER-G platform

The SYNER-G consortium:

Aristotle University of Thessaloniki (coordinator)	
Vienna Consulting Engineers	
Bureau de Recherches Geologiques et Minieres	
Commission of the EC - Joint Research Centre	
Norwegian Geotechnical Institute	
University of Pavia	
University of Roma "La Sapienza"	

Middle East Technical University	
AMRA, University of Naples Federico II	
University of Karlsruhe	
University of Patras	
Willis Group Holdings	
Mid-America Earthquake Center, University of Illinois	
Kobe University	

ΤΙΜΗΤΙΚΕΣ ΔΙΑΚΡΙΣΕΙΣ ΕΛΛΗΝΩΝ ΓΕΩΜΗΧΑΝΙΚΩΝ



Ο Ηλίας Μιχάλης προσκεκλημένος ομιλητής

Το μέλος της ΕΕΕΕΓΜ Ηλίας Μιχάλης θα παρουσιάσει προσκεκλημένη ομιλία την πρώτη ημέρα του συνεδρίου "Underground Infrastructure & Deep Foundations Qatar" (9 - 12 Ιουνίου 2013 στην Doha, Qatar) με τίτλο "Jet Grouting Applications in weak rock conditions – Experiences gained from Athens Metro Project". Ο Ηλίας Μιχάλης εργάζεται τα τελευταία χρόνια ως Tunnelling Expert στην Qatar Rail.

ΘΕΣΕΙΣ ΕΡΓΑΣΙΑΣ ΓΙΑ ΓΕΩΜΗΧΑΝΙΚΟΥΣ



Advanced Laboratory Test Specialists

Job number 3275
Company Fugro Geoconsulting Ltd. - Wallingford
Level
Apply before 31 May 2013

Fugro GeoConsulting Limited is a consultancy company within the global Fugro Group, the world's largest integrated geotechnical, survey and geosciences company. Our primary aim is to provide a complete service for the offshore oil and gas industry in the areas of Geophysics, Geology, Geohazard Assessment and Geotechnical Engineering.

Our team of in-house consultants reviews geological, geophysical and geotechnical data, performs initial site assessments, supervises offshore site investigation and laboratory testing programmes and performs geotechnical analyses and foundation design.

Fugro GeoConsulting Limited therefore merges the talents of the Fugro's consultancy resources related to Geophysics, Geology, Geohazards, Geotechnics, Geotechnical Testing, and Project Management.

The company provides an unequalled GeoConsulting service at all stages of offshore field development, providing expert advice from the initial concept stages through field work and on through to the detailed design of the facilities and their installation and operation.

Fugro GeoConsulting also has access to a wide range of vessels and equipment for the effective performance of geophysical and geotechnical field investigations.

In the Fugro Group, the commitment to Quality, Health and Safety and the Environment is of paramount importance. As part of this commitment, Fugro GeoConsulting Limited is a member of the British Safety Council and holds certification to the management system standards ISO9001, ISO17025 and OHSAS18001.

Advanced Laboratory Testing

Position

Are you passionate about laboratory testing?
Do you enjoy "fine-tuning" complex instruments to obtain the best performance?
Are you able to modify standard methods to fit unusual samples?
Can you create the test methods of the future?

Fugro runs one of the World's leading geotechnical research and testing laboratories at Wallingford. Many of the designers of the foundations for the world's tallest buildings, largest bridges and offshore oil, gas and renewables energy

installations rely on our laboratory data. Our existing 35 staff specialise in testing soils with exotic characteristics and to predict how they will react to dynamic loads, for example those coming from an earthquake.

We are currently making a £1M-plus investment in expanding the laboratory and we have a number of vacancies for Laboratory Test Specialists.

Position requirements

Experience of geotechnical testing soils is an advantage but is not a requirement as training will be provided.

More important is your passion for laboratory testing and keenness to get your test methods just right. If you think like us, we would love to hear from you.

What we offer

A competitive salary and benefits package is available.

Applicants should ensure that they meet the UKBA requirements to work in the UK.

To apply, please send your CV and a covering letter, detailing your current salary or salary expectations to hr.geoconsulting@fugro.com

ΠΡΟΣΕΧΕΙΣ ΕΚΔΗΛΩΣΕΙΣ ΓΕΩΤΕΧΝΙΚΟΥ ΕΝΔΙΑΦΕΡΟΝΤΟΣ ΣΤΗΝ ΕΛΛΑΔΑ



2^ο ΠΑΝΕΛΛΗΝΙΟ ΣΥΝΕΔΡΙΟ ΦΡΑΓΜΑΤΩΝ ΚΑΙ ΤΑΜΙΕΥΤΗΡΩΝ

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

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

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

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

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

Το συνέδριο στοχεύει στην παρουσίαση, ανάδειξη και συζήτηση των ανωτέρω ζητημάτων και απευθύνεται σε όλους όσοι με την μελέτη, κατασκευή και διαχείριση έργων φραγμάτων και ταμιευτήρων.

Θεματολόγιο

1. Φράγματα και Ολοκληρωμένη Διαχείριση Υδατικών Πόρων

- Ο ρόλος των ταμιευτήρων στην ολοκληρωμένη διαχείριση υδατικών πόρων
- Ταμιευτήρες πολλαπλού σκοπού
- Αντιπλημμυρική προστασία
- Τεχνικο-οικονομικά κριτήρια υλοποίησης νέων φραγμάτων

- Ο ρόλος των φραγμάτων στον ενεργειακό σχεδιασμό - Σύγχρονες τάσεις και τεχνολογικές εξελίξεις
- Ταμιευτήρες - Αντλητικά και υβριδικά συστήματα παραγωγής ενέργειας

2. Εξελίξεις στις Μεθόδους Σχεδιασμού & Κατασκευής

- Υλικά κατασκευής φραγμάτων - Μέθοδοι κατασκευής - Νέες τεχνικές
- Εκτίμηση, επιλογή και αναθεώρηση πλημμυρών σχεδιασμού
- Σχεδιασμός και αναβάθμιση υπερχειλιστών
- Έργα στεγάνωσης και αποστράγγισης φράγματος και θεμελίωσης
- Η επιρροή των γεωλογικών συνθηκών στον σχεδιασμό
- Εξελίξεις στον γεωτεχνικό σχεδιασμό
- Εξελίξεις στον αντισεισμικό σχεδιασμό
- Εξελίξεις στον Η/Μ εξοπλισμό

3. Ασφάλεια Φραγμάτων και Ταμιευτήρων

- Κανονισμοί μελέτης, κατασκευής και λειτουργίας φραγμάτων
- Η πρόταση της ΕΕΜΦ για την σύνταξη εθνικού κανονισμού ασφάλειας φραγμάτων
- Αποτίμηση της διακινδύνευσης φραγμάτων (risk assessment)
- Δημόσιοι και ιδιωτικοί φορείς εμπλεκόμενοι στη διαχείριση φραγμάτων - θέματα οργάνωσης και τεχνικής ικανότητας
- Κίνδυνοι σχετιζόμενοι με προβλήματα οργάνωσης του κυρίου - διαχειριστή του έργου
- Απαιτήσεις παρακολούθησης συμπεριφοράς
- Ασφάλεια ταμιευτήρα (ευστάθεια πρανών, εκτεταμένες διαρροές κτλ)
- Αναλύσεις θραύσης φράγματος και επιπτώσεις
- Μακροχρόνια συμπεριφορά, γήρανση των έργων και εργασίες αποκατάστασης
- Κίνδυνοι οφειλόμενοι σε αστοχίες Η/Μ εξοπλισμού
- Παρουσίαση πρόσφατων συμβάντων ή περιστατικών
- Φράγματα, ταμιευτήρες και δημόσια ασφάλεια
- Ασφαλής παροχέτευση εκτάκτων πλημμυρικών παροχών κατάντη - απαιτήσεις οριοθέτησης της κοίτης

4. Φράγματα, Ταμιευτήρες και Περιβάλλον

- Φιλικές προς το περιβάλλον κατασκευές φραγμάτων και ταμιευτήρων
- Φράγματα, ταμιευτήρες και αειφορία
- Περιβαλλοντική και κοινωνικά αποδοχή φραγμάτων και ταμιευτήρων - Συμμετοχικές διαδικασίες στο σχεδιασμό και υλοποίηση
- Περιορισμός υδρομορφολογικών αλλοιώσεων και αισθητική αποκατάσταση περιβάλλοντος
- Αρχιτεκτονικός σχεδιασμός φραγμάτων και συναφών κατασκευών
- Τα φράγματα ως μέρος της πολιτιστικής κληρονομιάς
- Εμπλουτισμός και αποκατάσταση υπόγειων υδροφόρων - Δημιουργία υγροβιότοπων κ.λπ.
- Χρονική εξέλιξη των ποιοτικών χαρακτηριστικών των ταμιευτήρων - Διατήρηση και βελτίωση ποιότητας υδατικών πόρων
- Φερτές ύλες

5. Παρουσίαση έργων

Κρίσιμες ημερομηνίες για την αποστολή εργασιών:

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

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

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

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



6^ο ΠΑΝΕΛΛΗΝΙΟ ΣΥΝΕΔΡΙΟ ΛΙΜΕΝΙΚΩΝ ΕΡΓΩΝ Αθήνα 11 - 14 Νοεμβρίου 2013

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

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

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

Θεματολόγιο

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

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

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

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

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

The theme of EETC2014 Athens is:

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

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

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

TOPICS:

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

ΠΡΟΣΕΧΕΙΣ ΓΕΩΤΕΧΝΙΚΕΣ ΕΚΔΗΛΩΣΕΙΣ

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

2nd International Conference on Solid Waste 2013: Innovation in Technology and Management, 5 - 8 May 2013, Hong Kong, China, <http://arcpe.hkbu.edu.hk/conf2013>

Symposium on Tunnelling in Mediterranean Region, 7-8 May 2013, Porec, Istria, Croatia, www.meditunnel2013.com

International Conference on Innovation in Civil Engineering, May 9th & 10th, 2013, Vidya Nagar, Palissery, Karukutty, India, www.scmsgroup.org/sset

IGS-Incheon 2013 - 5th International Symposium on Geotechnical Engineering, Disaster Prevention and Reduction, and Environmentally Sustainable Development, May 15-17 May 2013, Incheon, South Korea, www.geochina-cces.cn/download/2013_5th_Dsiaster_prevention_Bulletin_1.pdf

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

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

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



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

The conservation of monuments and historic sites is one of the most challenging problems facing modern civilization. It involves a number of factors belonging to different fields (cultural, humanistic, social, technical, economical, administrative), intertwining in inextricable patterns. In particular,

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

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

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

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

Scientific secretariat

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WTC 2013 ITA-AITES World Tunnel Congress and 39th General Assembly "Underground - the way to the future",

Geneva, Switzerland, May 31 to June 7, 2013.
www.wtc2013.ch

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

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

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

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

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

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

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

ICEGECHP 2013 International Conference on Earthquake Geotechnical Engineering From Case History to Practice In honour of Prof. Kenji Ishihara, 17 – 19 June 2013, Istanbul, Turkey, www.icege2013.org

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

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

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

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

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

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

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

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

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

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

13th International Conference of the Geological Society of Greece, September 5-8 2013, Chania, Greece, www.ege13.gr

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

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

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

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

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

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



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

Cold regions cover 50% of the world's total land area. All transportation infrastructures in cold regions face great technical challenges due to ground freeze-thaw or permafrost degradation. New transportation infrastructure on embankments, such as high-speed railways on slab tracks or highways, requires high geometry standards. In China, the Qinghai-Tibet Railway has been in operation for more than 6 years but now faces issues due to permafrost degradation. More challenging technical problems will arise as more transportation infrastructure, such as highways, is being planned and/or constructed in Northwest and Northeastern China, Russia as well as the North America.

The First International Symposium on Transportation Soil Engineering in Cold Regions - a joint conference with the 10th Shahuniants Lecture aims to provide an opportunity for researchers and practitioners in the transportation community to share the latest research advances and ex-

periences in the construction of transportation infrastructure in cold regions. The Shahuniants Lecture has been given regularly among Russian scientists for many years and this is the first time to have its abroad section outside of Russia.

Main Topics including the cold regions aspects of:

- Mechanical behavior of soil and aggregate
- Coupled modeling of mechanical and physical processes
- Frost heave and thaw weakening of ballasted subgrade and base of slab track
- Field experiments in roadway embankments
- Long-term monitoring of subgrade functionality
- Non destructive testing of subgrade and aggregate
- Dynamic/seismic behavior of transportation infrastructure
- Other related topics related to transportation soil engineering in cold regions

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

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

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



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

The objects of cultural heritage of many historical towns of Ukraine turned out in heavy town buildings surroundings, where new and old buildings, transport highways, communications, other objects of a dense municipal infrastructure, interact practically on every step. There are especially dangerous conditions for a right-bank ridge of the Kyiv heights, including the Dnepr slopes and the adjoining territories of the historical centre of the capital of Ukraine – City of Kyiv, where significant objects of cultural heritage located such as the Saint-Sophia Cathedral and Related Mo-

nastic Buildings, Kiev-Pechersk Lavra, which have been entered in the World Heritage List of UNESCO.

This territory that formed the historical silhouette of Kyiv from time immemorial is located in the extraordinarily difficult engineer-geological conditions caused by its natural features and considerable technogenic loading from the urban infrastructure.

There are significant factors of geological risk inherent such territory including endogenous processes (seismicity, contemporary motions of the parts of earth's crust, displacements of environment along the breaks of a crystalline foundation) and exogenous processes (erosion, subsidence and displacements of the earth surface) that at the time of the technogenic impacts acquire destructive character.

The geoecological risk is inherent for the territories of the other historical cities, the natural features of which provoke the development of the numerous zones of the geodynamic tensions that induces a development of the dangerous processes in a geological environment. Complexity of the tasks of the engineering protection of the urbanized territories saturated by the objects of the cultural heritage and suffered from the geological risk cause the necessity of an intensive collaboration in the interdisciplinary researches. It is extremely necessary to develop and to implement strategies of the threats prediction, prevention and neutralization of the dangerous processes. Therefore Kiev is the proper place to play a role of a host of meeting of specialists to develop approaches for the solution of these problems.

Dear colleagues! We have the honor of inviting you to participate in the International scientific and practice conference "Problems and experience of the engineering protection of urbanized territories and a safeguarding of the heritage under conditions of the geoecological risk", which will take place in Kiev, on November 5-7, 2013.

The leading international specialists in area of engineering geology, geophysical, geoecological and geotechnical problems will take part in the Conference.

The conference is organized under patronage of the National Commission of Ukraine in affairs of UNESCO and supported by the Ministry of culture of Ukraine. The organizing committee will make all efforts, that participants got new interesting information, exchange ideas and simultaneously pleasantly spend time in Kyiv.

Conference Topics

1. Natural and naturally- technogenic risks in the urbanized territories: their investigation, analysis, monitoring, modelling, prediction, prevention, and management.
2. Engineering survey for the rational use of historical territories, providing heritage safeguarding and municipal infrastructure safety.
3. Engineering protection of territories under the impact of various natural and natural anthropogenic hazards: endogenous geological (including seismic) hazards; exogenous geological hazards; hydro geological and hydro meteorological dangers.
4. Safeguarding of the immovable cultural heritage and its surrounding under conditions of geo-ecological risk.
5. Urban environmental geotechniques: geotechnical accompaniment of safeguarding of historical buildings under conditions of the geoecological risks; foundations strengthening and improvement soils including conditions of the gravitational processes on the slopes; preservation of hydro geological situation, geotechnical sustainability.

6. Systems of early exposure of threat of emergencies in the urbanized territories with a risk and display of dangerous geological processes.

It is especially desirable within the framework of mentioned above, development and realization of strategies of prediction, prevention and neutralization the threats of the dangerous processes.

Secretariat of Conference

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6^ο ΠΑΝΕΛΛΗΝΙΟ ΣΥΝΕΔΡΙΟ ΛΙΜΕΝΙΚΩΝ ΕΡΓΩΝ, Αθήνα 11 - 14 Νοεμβρίου 2013, lhv@central.ntua.gr

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

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

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

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

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

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

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

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

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

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



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

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

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

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

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

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

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



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

Organizer: TC105
Contact person: Professor Kenichi Soga
University of Cambridge, Department of Engineering,
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JUBILEE CONFERENCE
50th Anniversary of Danube-European
Conferences on Geotechnical Engineering
Geotechnics of Roads and Railways
9 - 11 September 2014, Vienna, Austria
www.decge2014.at

The Austrian Society for Soil Mechanics and Geotechnical Engineering (ASSMGE) has the pleasure of inviting you to participate in the XV Danube-European Conference on Geotechnical Engineering to be held in Vienna, Austria, on September 9 - 11, 2014.

The Conference is held under the auspices of the International Society for Soil Mechanics and Geotechnical Engineering (ISSMGE).

50TH ANNIVERSARY

In the year 1964 the Danube-European Conferences on Geotechnical Engineering were founded in Vienna by the ÖIAV (Austrian Society of Engineers and Architects) with its branches for Geotechnical Engineering (Member Society of ISSMGE) and Road Engineering (Member Society of PIARC). The aim of these conferences was to bring together colleagues from East and West, from either side of the Iron Curtain. The Danube region (incl. catchment areas) has always fostered close cultural, economic and personal relations. Therefore, the vision at that time was a reunion of this region. Meanwhile, the Danube-European Conferences have proved to be a long-term success for already 50 years.

CONFERENCE THEME

The general theme of the conference is "Geotechnics of Roads and Railways" – as it was 50 years ago at the first DECGE. Specifically, the topics to be covered are:

- Earthworks, mainly embankments
- Compaction of soil and other granular materials
- Soil stabilization with lime, cement, etc.
- Deep soil improvement
- Geotechnics of road and railtrack structures (from sub-grade to base or ballast, resp.)
- Freezing-thawing problems of roads, railways
- Geosynthetics in road and railway engineering

- Use of waste material and industrial byproducts for roads and embankments
- Slope stability problems
- Retaining structures
- Bridge foundations
- Tunnelling

CONTACT

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www.decge2014.at



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

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

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

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



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

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

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

Contact

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



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

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

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



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



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

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

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

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XVI ECSMGE 2015

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

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

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

Man swallowed by a Sinkhole in Shenzhen city, China. Moment captured on Video



Guardian.co.uk

On Wednesday 27th of March, a new sinkhole appeared in Shenzhen city in China swallowing a 25-yr old Chinese security guard. The moment was captured on video. The sinkhole was 65 ft deep, but the man was not initially killed. He was rescued, but died at the hospital of his injuries.

The guardian reports that residents had complained of tremors from a nearby construction site. An investigation is underway. The hole was filled with sandbags. See video embedded here and under Media below:

http://www.cbsnews.com/8301-202_162-57576780/video-captures-man-falling-into-sinkhole-in-china/

<http://www.guardian.co.uk/world/video/2013/mar/28/sinkhole-shenzhen-china-video>

(Geoengineer.org, Monday, 01 April 2013, http://www.geoengineer.org/news-center/news/item/504-man-swallowed-by-a-sinkhole-in-shenzhen-city-china-moment-captured-on-video?utm_source=GeoNewsletter+%2399%2C+April+2013&utm_campaign=Geo+News+30+April+2013&utm_medium=email)



7 record-breaking tunnels from around the world

Tunnels provide travelers with a quick and easy way to access hard-to-reach destinations, so it's no surprise that every year cities map out new tunnel designs. But high-tech building materials and advances in design are allowing for engineering feats never seen before. At higher altitudes, over longer distances, here are seven record-breaking tunnels that are stand alone tourist destinations.

1. Gotthard Base Tunnel, Switzerland



Once completed in 2016, the Gotthard Base Tunnel will be the longest railway tunnel in the world. The 35-mile tunnel cuts under the Swiss Alps at 8,000 feet below sea level and is expected to reduce travel time between Zurich and Milan by about an hour. The building of the tunnel was an arduous feat as eight lives were lost during the process. For an up-close look at the construction, the public can visit a multimedia exhibition for free or take a tour of a construction site along the tunnel.

2. Yerba Buena Island Tunnel, California



To cross over the San Francisco-Oakland Bay Bridge, drivers must travel through Yerba Buena Island by way of the Yerba Buena Island Tunnel. The tunnel, completed in 1936, remains the largest single-bore tunnel in the world, measuring 76 feet wide and 58 feet high. To accommodate the large amount of traffic that travels across the bridge, the tunnel consists of two decks, each carrying five lanes.

3. Lærdal Tunnel, Norway



Stretching 15 miles long, the Lærdal Tunnel is the longest road tunnel in the world. The tunnel cuts through a mountain range that sits between the cities of Oslo and Bergen, providing a faster and safer route for drivers, especially during the wintertime. To keep drivers alert during the 20-minute underground journey, architects built in three

"caves" or resting areas that feature vivid blue and yellow lights.

4. Aizhai Extra Large Suspension Bridge, China



This two-way, four-lane bridge is the highest and longest tunnel-to-tunnel suspension bridge in the world. The bridge, built to ease traffic, measures almost 4,000 feet long and crosses over a canyon 1,164 feet deep. It carries the Jishou-Chadong Expressway, which runs through a total of 18 different tunnels.

5. Channel Tunnel



The Channel Tunnel, commonly referred to as the Chunnel, is the world's longest undersea tunnel. Of its 31 miles, 23 miles are situated beneath the English Channel. The tunnel transports passengers and freight from Folkestone, Kent in England to Coquelles, Pas-de-Calais in France in as little as 30 minutes. As an added bonus, the Le shuttle and Eurostar trains that travel through the tunnel operate 365 days a year.

6. Seikan Tunnel, Japan



Until the Gotthard Base Tunnel is completed in 2016, the Seikan Tunnel holds the title of the longest operational railway tunnel in the world. Completed in 1988, the tunnel measures 33.5 miles long and links the islands of Honshu and Hokkaido. It is located almost 800 feet below sea level (beneath the Tsugaru Strait), making it one of the deepest

railway tunnels in the world. Before the installation of the tunnel, ferries carried passengers across the strait, but when a typhoon sank five ferries killing over 1,000 people, Japan honed in on a new means of transportation.

7. Fenghuo Mount Tunnel, China



The Fenghuo Mount Tunnel is the world's highest railway tunnel, reaching an elevation of 16,093 feet. The tunnel encases part of the scenic Golmud-to-Lhasa route, which is a route on the Qinghai-Tibet Railway. The train that travels the railway is nicknamed the "rocket to the rooftop of the world" because 80% of its route is at an elevation above 13,000 feet. To compensate for the lack of oxygen at such an altitude, the train is equipped with two oxygen sources as well as personal oxygen canisters.

(Laura Kelly / FoxNews.com, April 04, 2013, <http://www.foxnews.com/travel/2013/04/04/7-record-breaking-tunnels-from-around-world/>)



Η Γη ανοίγει κάτω από τα πόδια τους Καθημερινότητα έχει γίνει για τους κατοίκους της Samara η υποχώρηση του εδάφους

Εικόνες που φέρνουν στο νου τοπίο αποκάλυψης, αποτελούν μέρος της καθημερινότητας για τους κατοίκους της ρωσικής πόλης Samara, καθώς η ασφαλτος υποχωρεί με αποτέλεσμα να ανοίγονται μεγάλες τρύπες.

Τα ανοίγματα στο έδαφος «καταπίνουν» αυτοκίνητα, ενώ ορισμένες τρύπες είναι αρκετά μεγάλες για να εξαφανιστούν μέσα τους μέχρι και φορτηγά!

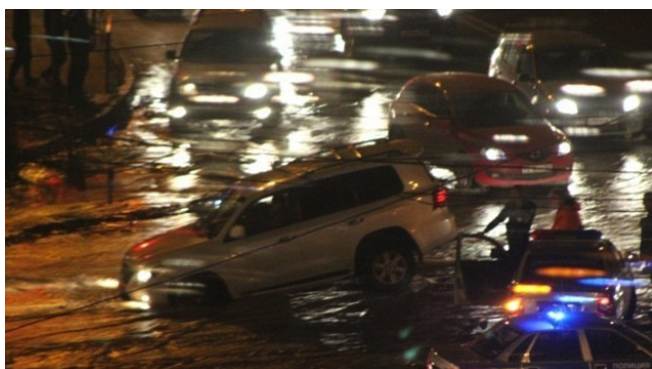
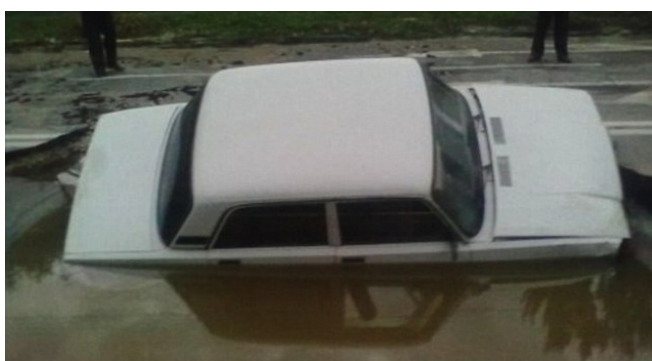
Τα ανοίγματα πιστεύεται ότι δημιουργούνται εξαιτίας της υποχώρησης του εδάφους. Καθώς ο πάγος λιώνει, το νερό προκαλεί διάβρωση του εδάφους κάτω από τους δρόμους της Samara, της έκτης μεγαλύτερης πόλης στη Ρωσία.

Οι τεράστιοι κρατήρες δημιουργούνται σε χώρους στάθμευσης, σε πολυσύχναστους δρόμους και σε μεγάλες ή μικρότερες οδικές αρτηρίες.

Οι πολίτες έχουν ήδη ξεκινήσει να μαζεύουν υπογραφές, πιέζοντας τις Αρχές να δώσουν λύση, καθώς ήδη ένας άνθρωπος έχει χάσει τη ζωή του.

Δείτε φωτογραφίες από τους δρόμους της Samara...

(Newsbeast.gr, 09 Απριλίου 2013, <http://www.newsbeast.gr/world/arthro/515764/i-gi-anoi-gei-kato-apo-ta-podia-tous>)



Huge landslide at the Kennecott Copper Bingham Canyon Mine Mine slope monitoring paid off



Source: NBC News

A landslide finally occurred at the Kennecott Copper Bingham Canyon Mine in Utah. The Kennecott Copper Bingham Canyon Mine is the second largest copper producer in the United States, providing approximately 25% of the country's copper needs. Kennecott produces approximately 275,000 tons of refined copper each year.

Rio-Tinto has been monitoring the slope and had observed movement since February. Movement accelerated in recent weeks leading to the failure on Thursday April 11 2013. The day before the slope was moving at a rate of 5 cm per day. Rio-Tinto, to its credit, apparently realized what was going to happen and had evacuated the mine at 11:00 am, about 10.5 hrs before the failure. The exact size of the slide has not yet been determined.

([Geoengineer.org](http://www.geoengineer.org), Friday, 12 April 2013, http://www.geoengineer.org/news-center/news/item/511-huge-landslide-at-the-kennecott-copper-bingham-canyon-mine-mine-slope-monitoring-paid-off?utm_source=GeoNewsletter+%2399%2C+April+2013&utm_campaign=Geo+News+30+April+2013&utm_medium=email)



Dump trucks sit under debris in the Kennecott Copper Bingham Canyon Mine after a landslide in Bingham Canyon, Utah (NBC, 11 April 2013, <http://photoblog.nbcnews.com/news/2013/04/11/UWf1kdUv07U.twitter>)



Άποψη αμέσως πριν από την κατολίσθηση



Άποψη αμέσως μετά την κατολίσθηση

(The Salt Lake Tribune, 11 April 2013, <http://www.sltrib.com/sltrib/news/56142197-78/mine-kennecott-bennett-bingham.html.csp>)

Norway wants to build world's first tunnel for ships

NORWAY'S government has announced plans for what is being labelled the world's first tunnel for large ships, aimed at helping them navigate a treacherous section of the southwestern coast.

Unveiling a 10-year transportation plan, the government said it would earmark one billion kroner (\$166 million) for the construction of the Stad maritime tunnel, named for the peninsula notorious for high winds and heavy seas.

The 1.7-kilometre passageway will be carved into a piece of the peninsula's mountainside, linking two fjords, hallmarks of the Norwegian coastline.

"The project will help increase safety and navigability" in the region, the government said.

Estimated at a cost of 1.6 billion kroner, construction is expected to begin in 2018 at the earliest and take four years. It was unclear how the costs exceeding the one billion kroner provided by the government would be financed.

Tunnels already exist for barges, for example in France's Canal du Midi, but the Stad tunnel will be the world's first that can accomodate large cargo and passenger vessels up to 16,000 tonnes.



This computer generated picture shows the so-called Stad Ship Tunnel. Picture: AFP /Stadskipstunnel.no/NORDWEST3D

"It will be the first tunnel in the world that can be used by big boats like cargo ships or the Coastal Express," the famed tourist ship that cruises along the Norwegian coast, said Ottar Nygaard, mayor of the small town of Selje and the head of the project.

According to a recent study conducted by the specialised company Nordvest Fjordservice, the waters of the Stad peninsula have seen 46 accidents and near-accidents and 33 deaths since the end of World War II.

(The Courier-Mail (Brisbane, Australia) / Agence France-Presse, April 15, 2013, <http://www.couriermail.com.au/travel/world/norway-wants-to-build-worlds-first-tunnel-for-ships/story-e6freqz6-1226620532661>)



Sinkhole swallowed three cars on the Southeast Side of Chicago



A sinkhole swallowed three cars on the Southeast Side of Chicago on, April 18, 2013 injuring one person. The injured man was driving when the road buckled and caved in. The other two vehicles were parked when the sinkhole opened.

Sinkholes occurs due to erosion beneath the surface, as when sand falls into underlying cavities, causing the surface to collapse. Flooding and heavy rain, excessive water pumping, water main breaks, earthquakes and construction can all contribute to sinkholes.

(Mike Krauser / WBBM Newsradio)

ΕΝΔΙΑΦΕΡΟΝΤΑ - ΣΕΙΣΜΟΙ

How It Works: The Earthquake Machine

The fundamentals of earthquake mechanics are simple: Pieces of rock slip past one another along a fault to release pent-up energy. Some of that energy ripples outward, causing seismic waves that shake the earth. But how long it takes and exactly how the energy dissipates has remained elusive. To discern these processes, researchers recently built a machine at the University of Oklahoma to mimic what happens inside the earth's crust. Two slabs of rock, ground against each other by a 500-pound flywheel, simulate fault stresses to provide data on the energetics of a tremor. "Most of the energy seems to go into heating, and some goes into grinding up material," says David Lockner, a geophysicist with the U.S. Geological Survey in Menlo Park, California. "What we're all familiar with—the energy that is radiated as ground shaking—ends up being 10 percent or less." Lockner says that understanding how an earthquake's energy evolves over time will help engineers design better earthquake-resistant structures.

BUILD ENERGY

The heart of the apparatus is a **flywheel**, a device that stores energy mechanically by spinning at high speeds. It's driven by a 100hp motor that can reach 3,300 rpm within $\frac{1}{10}$ of a second. The flywheel connects to a **central shaft**.

An additional shaft connects the **clutch** to a four-inch-diameter cylindrical block of **granite or dolomite**, which spins in sync with the flywheel. Researchers use the granite and dolomite as proxies for rocks in the Earth's crust.

Sensors next to and within the rock monitor how the material deforms, grinds, and heats up during the simulation. For example, **infrared sensors** and **thermocouples** measure rock temperature, while other sensors measure how fast the rock spins.

MODEL THE FAULT

To model earthquakes of varying magnitude, researchers start by spinning the flywheel at a given speed; a faster flywheel means a bigger quake. The researchers then disengage it from the motor, letting the flywheel spin on its own stored power.

Immediately afterward, the clutch engages, and the attached block of granite starts to spin. It grinds into a **stationary block of rock** positioned above. Where both rocks meet is the **experimental fault**.

At the experimental fault, the spinning rock transfers some of its kinetic energy to the stationary one, and they begin to grind and slip past each other—an earthquake in miniature.

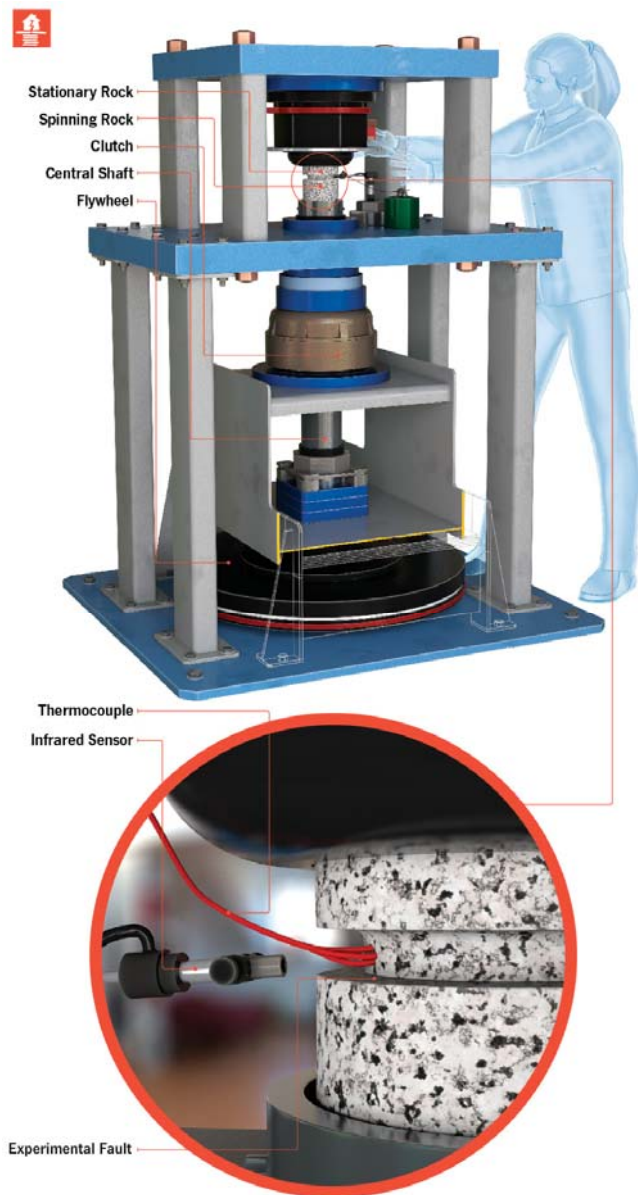
STATS

Height of the Machine in Feet: 5.9

Weight of the Flywheel in Pounds: 500

Seconds the Clutch Needs to Engage: 0.03

Magnitude of the Largest Earthquake Yet Simulated: 8.0

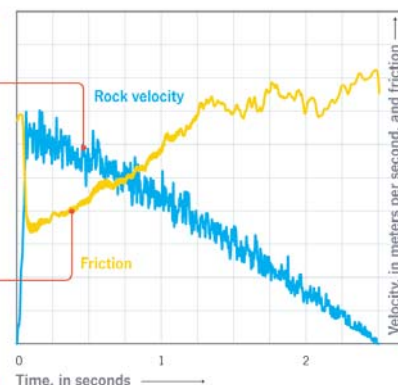


Earthquake Simulation Machine

EARTHQUAKE IN A LAB

Movement along the experimental fault speeds up before slowing down—matching the pattern of a real earthquake.

Friction spikes, drops as rock dust lubricates the fault, and then rises again as the rocks slow. The researchers are investigating how the fault dissipates energy to slow down and stop an earthquake.



Earthquake In A Lab

(Rebecca Boyle / Popular Science, 11 April 2013, <http://www.popsci.com/technology/article/2013-03/earthquake-machine>)

Fracking does not cause earthquakes that can be felt on the surface in the vast majority of cases, claims new research

A study of hundreds of thousands of hydraulic fracturing operations that use a controversial method of extracting shale gas trapped in underground rocks found just three examples where the process has caused tremors on the surface.

The research, led by Durham University, also found the size and number of detected earthquakes caused by fracking was low compared to those caused by other manmade triggers such as mining, geothermal activity or reservoir water storage.

'In almost all cases, the seismic events caused by hydraulic fracturing have been undetectable other than by geoscientists,' said Prof Richard Davies from Durham Energy Institute.

'So we have concluded that hydraulic fracturing is not a significant mechanism for inducing felt earthquakes. It is extremely unlikely that any of us will ever be able to feel an earthquake caused by fracking.'

He added this possibility could not be ruled completely but that there were ways to mitigate against it, particularly by avoiding critically stressed faults that already near breaking point.

Previous research, including the study that found tremors felt in Lancashire in 2011 were likely caused by nearby fracking operations, has reached similar conclusions about the relationship between hydraulic fracturing and earthquakes.

The process, which is widely used in the US and has been trialled in the UK, involves pumping large amounts of water and chemicals into the ground under pressure to fracture rocks and release the gas trapped inside them.

The UK government last year introduced guidelines for fracking operations with the aim of preventing dangerous seismic activity, after it lifted a temporary ban on the process introduced following the Lancashire tremors.

This included a traffic light system requiring fracking companies to pause and review their operations if seismic activity reaches magnitude 0.5 by conducting constant seismic monitoring before, during and after the operation.

The Durham study examined all human-induced earthquakes since 1929. Of the three fracking-related quakes felt at the surface, the largest, detected in Canada in 2011, had a magnitude of only 3.8. The Lancashire tremor had a magnitude of 2.3.

Other criticisms of fracking include its potential to contaminate ground water supplies with chemicals or gas, as well as the fact that it increases supplies of fossil fuels at a time when the world should be switching to low-carbon energy sources.

New UK regulations mean companies are required to disclose the chemicals they use in their fracking fluid and that only substances not deemed to be hazardous to the water supply can be licensed for use.

Well inspections by third-party advisers and government officials will also be mandatory in an attempt to ensure the

integrity of wells and prevent the contamination of the ground or water supply.

(the engineer / 10 April 2013, <http://www.theengineer.co.uk/energy-and-environment/news/fracking-not-significant-cause-of-earthquakes-says-report/1016019.article#ixzz2Q4CrGe7t>)

Ανθρώπινες ενέργειες που μπορεί να «δώσουν» σεισμό

Περιορισμένος είναι ο κίνδυνος πρόκλησης σεισμών από διάφορες ανθρώπινες ενέργειες, όπως παραδείγματος χάριν είναι οι γεωτρήσεις ή η δημιουργία και εκμετάλλευση ορυχείων. Σύμφωνα με Βρετανούς επιστήμονες, ελάχιστες είναι οι σεισμικές δονήσεις που μπορούν να αποδοθούν στην τεχνική της υδραυλικής ρωγμάτωσης ή διάρρηξης, που ακολουθείται προκειμένου να ληφθεί πετρέλαιο από πετρώματα όταν αυτό δεν είναι δυνατόν να γίνει με άλλη μέθοδο.

Νερό, άμμος και διάφορα χημικά εισέρχονται υπό υψηλή πίεση στο υπέδαφος έτσι ώστε κυριολεκτικώς να ανοίξουν τα ιζηματογενή πετρώματα και να απελευθερώσουν τα πολύτιμα καύσιμα από το εσωτερικό τους.

Πολέμιοι της μεθόδου υποστήριζαν ότι η διαδικασία είναι επικίνδυνη επειδή μπορεί να προκαλέσει επίσκεψη του Εγκέλαδου, όπως συνέβη στο Λανκαστερσάιρ το 2011.

Η έρευνα που εκπόνησαν οι επιστήμονες του Ινστιτούτου Ενέργειας του Πανεπιστημίου του Ντέραμ δείχνει ότι η διοχέτευση του υγρού που χρησιμοποιείται για τη διαδικασία μπορεί να επανενεργοποιήσει κάποια ρήγματα που βρίσκονται εν υπνώσει. Συγκριτικά όμως με άλλες δραστηριότητες, όπως παραδείγματος χάριν η εξόρυξη μετάλλου και το γέμισμα δεξαμενών, η υδραυλική ρωγμάτωση δεν αποτελεί μεγαλύτερο κίνδυνο και οι σεισμικές δονήσεις που προκαλούνται σπάνια γίνονται αισθητές μέχρι την επιφάνεια.

«Μελετήσαμε 198 περιπτώσεις σεισμικών δονήσεων που είχαν προκληθεί από ανθρώπινη δραστηριότητα από το 1929 έως σήμερα», λέει ο καθηγητής Ρίτσαρντ Ντέιβις του Πανεπιστημίου του Ντέραμ. «Η υδραυλική ρωγμάτωση ως διαδικασία δεν είναι από αυτές με τις μεγαλύτερες πιθανότητες να προκαλέσουν σεισμό», υπογράμμισε.

Οι ερευνητές, στη μελέτη που δημοσιεύεται στην επιθεώρηση Journal of Marine and Petroleum Geology, αναφέρουν ότι από τους σεισμούς που μελέτησαν, μόνο τρεις σεισμικές δονήσεις μπορούν να αποδοθούν στη συγκεκριμένη τεχνική. Πρόκειται για έναν σεισμό στη Βρετανία, έναν στις ΗΠΑ και έναν στον Καναδά, όπου συνέβη και η μεγαλύτερη τέτοια δόνηση το 2011. Ο σεισμός είχε μέγεθος 3,8 βαθμών της κλίμακας Ρίχτερ.

«Τα περισσότερα σεισμικά συμβάντα που προκαλούνται από τη συγκεκριμένη τεχνική είναι πολύ μικρού μεγέθους και η ενέργεια που απελευθερώνεται είναι ίση ή πιθανώς να είναι μικρότερη από αυτή που απελευθερώνεται όταν κάποιος ηγείται από μια σκάλα στο δάπεδο», εξηγεί ο Βρετανός καθηγητής.

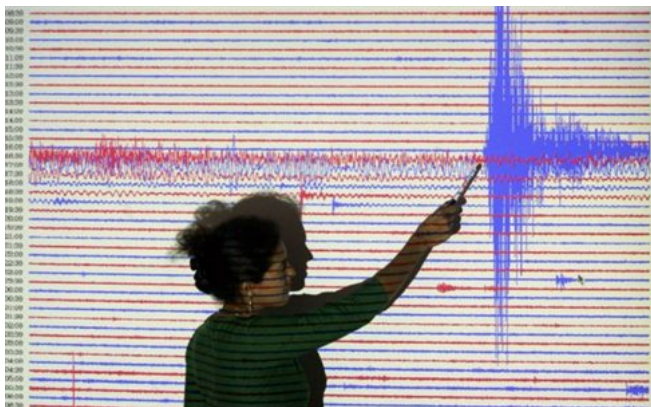
Τα υδάτινα απόβλητα

Ισχυρότερες σεισμικές δονήσεις μπορεί να προκαλέσει μια άλλη διαδικασία, αυτή της έγχυσης στο υπέδαφος των υδάτινων αποβλήτων της γεώτρησης. Πρόκειται για πρακτική που απαγορεύεται από τη νομοθεσία της Ε.Ε. Σύμφωνα με ειδικούς, αυτή η τεχνική προκάλεσε στην Οκλαχόμα έναν σεισμό μεγέθους 5,7 Ρίχτερ.

Το μοναδικό που μπορεί να γίνει ώστε να εξουδετερωθεί εντελώς ο κίνδυνος σεισμού από τις γεωτρήσεις είναι να μην πραγματοποιούνται κοντά σε τεκτονικά ρήγματα.



Άσκηση ετοιμότητας Ισχυρός σεισμός προγραμματίζεται για την Τε- τάρτη στη Θεσσαλονίκη



Η Καλαμαριά θα δοκιμάσει την ετοιμότητά της για ενδεχόμε-
νο χτύπημα του Εγκέλαδου

Τέσσερα λεπτά μετά τη μία το μεσημέρι της Τετάρτης, μια σεισμική δόνηση μεγέθους τουλάχιστον 6 βαθμών Ρίχτερ προγραμματίζεται να σημειωθεί στη Θεσσαλονίκη. Είναι το σενάριο της μεγαλύτερης μέχρι σήμερα άσκησης που θα πραγματοποιήσει η Μητροπολιτική Ενότητα Θεσσαλονίκης σε συνεργασία με το Δήμο Καλαμαριάς.

Την ώρα του σεισμού θα σημάνει ηχητικό σήμα στις περιοχές όπου εμφανίζονται «έκτακτα περιστατικά». Αμέσως μετά, εκπρόσωποι από κάθε εμπλεκόμενο φορέα θα συγκεντρωθούν στο κέντρο επιχειρήσεων της Περιφέρειας, από όπου θα συντονίζεται ο απεγκλωβισμός και η μεταφορά τραυματιών, η εκκένωση σχολείων, η συγκέντρωση των κατοίκων της Καλαμαριάς σε ανοιχτούς χώρους, καθώς και η διατήρησης ανοιχτών δρόμων από την αστυνομία.

«Πρόκειται για την πρώτη άσκηση επί πραγματικών γεγονότων, όσο πραγματικό μπορεί να είναι ένα σενάριο εκδήλωσης σεισμού, καθώς μέχρι τώρα οι όποιες ασκήσεις γίνονταν πραγματοποιούνταν επί χάρτου και σε επίπεδο δήμων» ανέφερε τη Δευτέρα ο αντιπεριφερειάρχης Θεσσαλονίκης Γιώργος Τσαμασλής.

Κατά τη διάρκεια συνέντευξης Τύπου επισήμανε ότι με τον «Καλλικράτη» η Περιφέρεια έχει πλέον την ευθύνη να αναλαμβάνει συντονιστικό ρόλο σε περίπτωση σεισμού. Η πρώτη άσκηση πραγματοποιείται στην Καλαμαριά, η οποία διαθέτει «καλό επίπεδο προετοιμασίας» ενώ σύμφωνα με μελέτη του ΑΠΘ είναι πιο ευαίσθητη σε έναν τέτοιο κίνδυνο.

Αμέσως μετά την ολοκλήρωση της άσκησης, ανεξάρτητοι παρατηρητές θα προχωρήσουν σε εν θερμώ αποτίμηση των χρόνων παρέμβασης σε καθένα από πέντε σημεία: δύο σχολεία, μία δημόσια υπηρεσία, μία διασταύρωση οδών και ένα οικοδομικό τετράγωνο.

Στη συνέχεια το σύνολο της άσκησης θα αξιολογηθεί ώστε να διαπιστωθεί που υπάρχουν προβλήματα και να γίνει καλύτερος σχεδιασμός σε επόμενες ασκήσεις που θα γίνουν από το φθινόπωρο και σε άλλους δήμους, ενώ αργότερα

προβλέπεται να πραγματοποιηθεί μεγαλύτερη άσκηση σε επίπεδο νομού Θεσσαλονίκης.

Όπως γνωστοποίησε εξάλλου ο εντεταλμένος σύμβουλος της Περιφέρειας σε θέματα πολιτικής προστασίας, Βασίλης Τουλίκας, αντίστοιχη προετοιμασία θα γίνει για σενάρια πλημμυρών και πυρκαγιάς.

Σε ερώτηση για το εάν η προγραμματισμένη άσκηση σχετίζεται με την πρόσφατη παρουσίαση από το ΑΠΘ σεναρίων για τις επιπτώσεις από πιθανό σεισμό στην ευρύτερη περιοχή της Θεσσαλονίκης, ο κ. Τσαμασλής διευκρίνισε ότι δεν υπάρχει καμία τέτοια σχέση.

Τόνισε ωστόσο ότι η Περιφέρεια βρίσκεται σε συνεργασία τόσο με το Εργαστήριο Γεωφυσικής του ΑΠΘ όσο και με το Τμήμα Πολιτικών Μηχανικών του ΑΠΘ που ασχολούνται με το θέμα.

(Newsroom ΔΟΛ, 22 Απρ. 2013, <http://news.in.gr/science-technology/article/?aid=1231245316>)

Συναγερμός στην Καλαμαριά Το σενάριο της άσκησης ετοιμότητας για σεισμό στη Θεσσαλονίκη



Το ΕΚΑΒ κλήθηκαν να απομακρύνουν τραυματίες κάτω από δύσκολες συνθήκες

Οι σειρήνες άρχισαν να ηχούν στις 13.04 στο Δήμο Καλαμαριάς της Θεσσαλονίκης στο πλαίσιο άσκησης για την αντιμετώπιση σεισμού άνω των 6 βαθμών στην κλίμακα Ρίχτερ.

Οι αρχές αντιμετώπισαν την άσκηση ως πραγματικό περιστατικό και εκκένωσαν άμεσα την περιοχή γύρω από το θέατρο «Μελίνα Μερκούρη», όπου συστεγάζονται το ωδείο και ακόμα δύο υπηρεσίες του δήμου.

Ο κόσμος που βρίσκεται στο κτήριο αρχίζει να τρέχει και ένας εύσωμος κύριος σπεύδει να σώσει έναν τραυματία. Λίγο αργότερα, όμως, παθαίνει και ο ίδιος έμφραγμα.

Ασθενοφόρο του ΕΚΑΒ καταφθάνει στο σημείο, λίγο αργότερα όμως στο ξεσπά πυρκαγιάς στο κτήριο. Τέσσερα οχήματα της πυροσβεστικής σπεύδουν στην περιοχή, όπου ήδη

βρίσκεται η αστυνομία και ομάδες της υπηρεσίας πολιτικής προστασίας και της δημοτικής αστυνομίας.

Ένα τμήμα του σεναρίου προέβλεπε ότι οι πυροσβέστες βρίσκουν εμπόδιο στην προσπάθειά τους να προσεγγίσουν το σημείο: ένα φορτηγό που μετέφερε μπιρρες έχει ανατραπεί, και πρέπει να μετακινηθεί από τις υπηρεσίες του δήμου.

Στο μεταξύ, εκκενώνεται μια πολυκατοικία στο Καραμπουρνάκι, όπου βρίσκονται περίπου 30 άτομα, ανάμεσά τους και ένας άνδρας με σπασμένο ισχίο. Αστυνομικός της ομάδας "Ζήτα" ειδοποιεί το ΕΚΑΒ.

Την ίδια ώρα εκκενώνεται και το παρακείμενο σχολείο, όπου η ΕΜΑΚ αναλαμβάνει να απεγκλωβίσει δύο δάσκαλους που έλειπαν στην καταμέτρηση.

Το πέμπτο και τελευταίο σκέλος του σεναρίου αφορά διαδρομή στον κεντρικό αγωγό φυσικού αερίου σε ένα σχολείο στην οδό στη Σοφούλη, όπου δύο παιδιά με άσθμα λιποθυμούν και δέχονται τις πρώτες βοήθειες από το ΕΚΑΒ. Το σχολείο εκκενώνεται επιτυχώς καθώς οι πυροσβέστες σχηματίζουν με τις μάνικες «υδατοκουρίνα» προκειμένου να περιορίσουν το φυσικό αέριο.

«Η έκβαση της άσκησης ξεπέρασε τις προσδοκίες των υπευθύνων. Όλοι οι φορείς και οι υπηρεσίες συνεργάστηκαν άψογα» ανέφερε ο αντιπεριφερειάρχης Θεσσαλονίκης Γιώργο Τσαμασλή.

«Ήταν η πρώτη φορά που έγινε άσκηση με τη συμμετοχή του κόσμου» επισήμανε με τη σειρά του ο Μάκης Γιώτης, ένας από τους συντονιστές της άσκησης στην υπηρεσία πολιτικής προστασίας του δήμου Καλαμαριάς.

Σύμφωνα με τον αντιπεριφερειάρχη παρόμοιες ασκήσεις θα γίνουν και σε άλλους δήμους της Θεσσαλονίκης.

(Newsroom ΔΟΛ, 24 Απρ. 2013, <http://news.in.gr/science-technology/article/?aid=1231245724>)



Researchers work to quake-proof nonstructural building parts

Quake studies a global draw in Reno

Japanese visitors view simulated temblor at Reno's world-renowned laboratory



Japanese civil engineering researchers were among those watching a small earthquake engineering test in the UNR large Scale Structures lab Monday April 23, 2013. Marilyn Newton/RGJ / RGJ

With the push of a button, a group of researchers created an earthquake Monday in Reno.

These were no mad scientists, but engineers simulating an earthquake at the world-renowned earthquake laboratory at the University of Nevada, Reno.

Using three 50-ton capacity shake tables, a two-story structure shuddered and shivered during a simulated high-level temblor at UNR's Large-Scale Structures Laboratory, which is the largest in the nation and among the largest in the world.

The test was part of a nearly \$4-million, groundbreaking project funded by the National Science Foundation to conduct the first research into making the nonstructural parts of buildings — water pipes, partition walls, ceiling tiles — more earthquake proof.

Although not key to buildings' structural integrity, the parts represent about 85 percent of its value, said Manos Maragakis, dean of UNR's College of Engineering.

"They also can cause lots of damage and down time because the building can't be used, and they can cause injuries or death," he said after Monday's test, which was observed by 10 Japanese engineers and professors.

"For example, a hospital after an earthquake might be structurally sound, but you get inside and it's a mess," Maragakis said. "The pipes have broken and the ceilings have fallen. So they can't use it and the hospital has to be closed."

Gov. Brian Sandoval is scheduled to visit the site today when another simulation will be conducted, marking the last test and the end of a six-year study of the impact of earthquakes on non-structural components.

The research project is one of only three Grand Challenge grants the National Science Foundation is funding, Maragakis said. The other two went to the University of California, Berkeley and the Georgia Institute of Technology.

Maragakis is the lead researcher on the UNR project and is working in collaboration with researchers at other institutions, including Cornell University.

"Tomorrow, when the governor is here, is the last test," he said. "I am excited that the governor is coming here, but I am even more excited that 11 Japanese came here for one day just to see the test."

"It shows how important this is and it also shows the reputation that we have at this university," Maragakis said. "Reno should be proud to have the biggest (earthquake simulation) facility in the country."

And one of the largest in the world, with a 10,000-square-foot laboratory.

A three-and-a-half-story expansion, scheduled to open in December, will give UNR's earthquake laboratory a total of 32,000 square feet, Maragakis said.

Japan's facility is about 50,000 square feet, but it only has one shake table to UNR's four, which are moveable and allow the Reno lab to reconfigure the tables to represent different structural designs, Maragakis said.

Kazuhiko Kasai, a professor and the director of the Structural Engineering and Research Center at the Tokyo Institute of Technology, attended Monday's simulated earthquake with fellow professors as well as engineers from major Japanese construction companies.

"You know, Japan is very advanced in terms of building protection, but we have not fully developed protection with the non-structural components," he said. "That really became a very big issue immediately after the (2011) Tohoku earthquake. Many ceilings fell down."

The 9.0 earthquake struck the northeastern coast of Honshu, Japan's main island, on March 11, 2011. It caused widespread damage and triggered a series of large tsunami waves along most of Japan's coastal areas, most notably in the Tohoku region. The earthquake and tsunamis left 15,883 people dead and 6,143 injured, with 2,681 others reported missing.

The damage to the inside of the buildings and having to close them until they could be repaired hurts the economy and the public, Kasai said.

"So it is a very big social and economic problem, especially if it happens in a big city like Tokyo," he said. "We believe protecting a human being is very important, but in addition, it is very important to continue business after an earthquake. This is a big issue, so we need this kind of simulation test."

Kasai said earthquake simulations can be run on computers, but they don't provide the same realistic information that UNR's Large-Scale Structures Laboratory does.

"You need a full-sized test and strong shaking, and I think this university has a very big facility to make it possible, so this test has been as very significant one," he said.

"The university is expanding its facility soon, and we look forward to visiting again and collaborating," Kasai said. "We also came down here to share our research. Maybe we can share information between our two countries."

Ian Buckle, director of the Large-Scale Structures Laboratory, said structural engineers have focused for decades on designing buildings so people can get out of them during earthquakes.

"As long as people can evacuate a building safely, it is considered to meet code," he said. "Many countries now realize this is not good enough and that being able to go to school the next day, go to work or conduct your business is essential in today's society. The Japanese recognize that."

"They, like us, are doing research into the behavior of non-structural components because one failure in a sprinkler system can close a building," Buckle said. "So the Japanese are here today because there are very few places in the world where you can do these kinds of full-scale experiments."

The addition to the Large-Scale Structures Laboratory now under construction will be a separate 3.5 story building adjacent to the current laboratory. It will house four 14-by-14-foot, 50-ton capacity shake tables capable of simulating any earthquake.

Buckle has said the addition will increase the amount UNR receives in research dollars as well as the university's ability to serve businesses that want to see if their engineering plans meet earthquake codes.

Large-Scale Structures Lab

- The laboratory and the Center for Civil Engineering Earthquake Research are located within the Department of Civil and Environmental Engineering at the University of Nevada, Reno.
- The laboratory houses four high-performance shake tables with the capability of simulating large earthquakes. Each shake table may be moved anywhere on the labora-

tory floor, which is unique to UNR's site. The table also can be used separately or together. The separate tables and the ability to move them allows them to be reconfigured to suit different structural designs.

- A 3.5-story building expansion adjacent to the current 10,000 square-foot earthquake lab is scheduled to open in December, and will bring the combined space of the two facilities to 32,000 square-feet.

Source: University of Nevada, Reno

MORE ON RGJ.COM

Watch the simulation of an earthquake hitting a two-story building at UNR's Large-Scale Structures Laboratory on RGJ.com/videos.

(Lenita Powers / Reno Gazette Journal (Nev.), 23.04.2013, <http://www.rgj.com/article/20130423/NEWS/304230008/Quake-studies-global-draw-Reno-watch-video-?qcheck=1>)

ΕΝΔΙΑΦΕΡΟΝΤΑ - ΛΟΙΠΑ

Τα ηφαίστεια του Αιγαίου πόλος έλξης για τουρίστες

Τα ηφαίστεια του Αιγαίου «μαγνήτης» για τολμηρούς τουρίστες που αρέσκονται στον ηφαιστειακό-γεωλογικό τουρισμό.



Υπάρχει ένα ξεχωριστό είδος τουριστών που αγαπά τις «ε-κρήξεις» και την περιπέτεια και προτιμά, αντί να ξεκουράζεται, κατακαλόκαιρο, σε κάποια παραλία, να περπατάει σε μια περιοχή που «βράζει» ο τόπος και η σκόνη σηκώνεται σύννεφο. Πρόκειται για τουρίστες που μαγεύονται από τα ηφαίστεια και σε κάθε ευκαιρία βρίσκονται κοντά σε κάποιον κρατήρα ή μέσα σε μια καλδέρα.

Τα μοναδικά αυτά στοιχεία, χιλιάδες τουρίστες μπορούν να τα βρουν καθ' όλη τη διάρκεια του χρόνου στην περιοχή του Αιγαίου Πελάγους και να ανακαλύψουν ένα νέο είδος τουρισμού, τον ηφαιστειακό - γεωλογικό.

Πιο γνωστό είναι το ηφαίστειο της Σαντορίνης, το οποίο έχει καλδέρα με ύψος 300 μέτρων και διάμετρο 11 χιλιομέτρων, και μαζί με αυτό της Νισύρου αποτελούν τα δύο μεγαλύτερα της Μεσογείου. Η Μήλος, τα Μέθανα και το Σουσάκι είναι περιοχές που επίσης διαθέτουν ενεργά ηφαίστεια, καθώς σύμφωνα με τους επιστήμονες ενεργά είναι αυτά που τα τελευταία 10.000 χρόνια έχουν δώσει έστω και μια έκρηξη.

"Εάν άλλες χώρες είχαν το Αιγαίο, με αυτά τα ηφαίστεια, θα έκαναν καταπληκτικά πράγματα. Είναι κράτη με ηφαίστεια μικρότερα από τα δικά μας και έχουν καταφέρει να αναπτύξουν ηφαιστειακό - γεωλογικό τουρισμό. Στην Κεντρική Γαλλία και στη Γερμανία δουλεύουν όλο τον χρόνο περιοχές με έναν κρατηράκο» αναφέρει στο ΑΠΕ - ΜΠΕ ο ομότιμος καθηγητής Ηφαιστειολογίας και Γεωθερμίας του Αριστοτέλειου Πανεπιστημίου Θεσσαλονίκης (ΑΠΘ) Μιχάλης Φυτίκας.

Στη Νίσυρο λειτουργεί επίσης Ηφαιστειολογικό Μουσείο, με δείγματα και εικόνες από τα πλέον εντυπωσιακά και χαρακτηριστικά πετρώματα και σχηματισμούς, χάρτες, τομές, διαγράμματα, πρότυπα ηφαιστειών και φωτογραφίες. Περιλαμβάνει εικόνες και πρότυπα άλλων ελληνικών ηφαιστειών καθώς και θέματα του ηφαιστειακού τόξου του Αιγαίου.

Το Ηφαιστειολογικό Μουσείο δημιουργήθηκε στο πλαίσιο του προγράμματος «Ανάδειξη Ηφαιστείου Νισύρου», πρόγραμμα που συντονίστηκε από τον Δήμο Νισύρου και χρηματοδοτήθηκε από την περιφέρεια Νοτίου Αιγαίου με χρηματοδότηση του Γ' Κοινοτικού Πλαισίου Στήριξης.

Υπενθυμίζεται πως τα ηφαίστεια της Σαντορίνης και της Νισύρου παρακολουθούνται στενά, με ειδικούς σταθμούς, και τα στοιχεία αναλύονται καθ' όλη τη διάρκεια του 24ώρου, ώστε να βγαίνουν σαφή συμπεράσματα για την ηφαιστειότητα της κάθε περιοχής.

"Τα δίκτυα παρακολουθούνται συνέχεια. Τα ηφαίστεια δεν είναι σαν τους σεισμούς που συμβαίνουν απροειδοποίητα. Μας ενημερώνουν εβδομάδες πριν και μπορούμε να λάβουμε τα κατάλληλα μέτρα» δήλωσε από την πλευρά του ο καθηγητής Σεισμολογίας του ΑΠΘ Δημήτρης Παναγιωτόπουλος.

Οι δύο παραπάνω καθηγητές, μαζί με τον καθηγητή Γεωλογίας και Κοσμήτορα της Σχολής Θετικών Επιστημών του ΑΠΘ, Σπύρο Παυλίδη, ανέλυσαν το θέμα των ηφαιστειών σε εκδήλωση με θέμα «Ηφαίστεια του Αιγαίου», που πραγματοποιήθηκε πρόσφατα στο Κέντρο Διάδοσης Επιστημών και Μουσείο Τεχνολογίας «ΝΟΗΣΙΣ», στην περιοχή της Θέρμης, στη Θεσσαλονίκη.

(Η ΚΑΘΗΜΕΡΙΝΗ / Πηγή: ΑΜΠΕ, 4 Απριλίου 2013, http://www.kathimerini.gr/4dcgi/w_articles_kathremote_104/04/2013_491787)

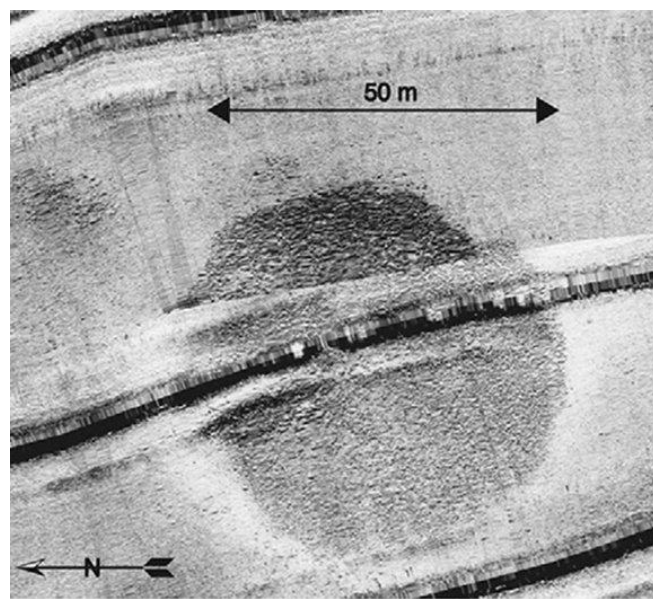


Mysterious stone structure found beneath Sea of Galilee

A giant "monumental" stone structure discovered beneath the waters of the Sea of Galilee in Israel has archaeologists puzzled as to its purpose and even how long ago it was built.

The mysterious structure is cone shaped, made of "unhewn basalt cobbles and boulders," and weighs an estimated 60,000 tons, the researchers said. That makes it heavier than most modern-day warships.

Rising nearly 32 feet (10 meters) high, it has a diameter of about 230 feet (70 meters). To put that in perspective, the outer stone circle of Stonehenge has a diameter just half that with its tallest stones not reaching that height.

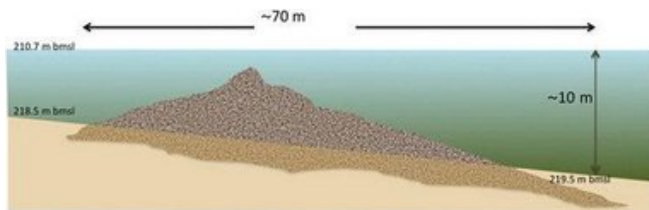


The circular structure was first detected in a sonar survey of part of the sea in the summer of 2003.

It appears to be a giant cairn, rocks piled on top of each other. Structures like this are known from elsewhere in the world and are sometimes used to mark burials. Researchers do not know if the newly discovered structure was used for this purpose.

The structure was first detected in the summer of 2003 during a sonar survey of the southwest portion of the sea. Divers have since been down to investigate, they write in the latest issue of the International Journal of Nautical Archaeology.

"Close inspection by scuba diving revealed that the structure is made of basalt boulders up to 1 m (3.2 feet) long with no apparent construction pattern," the researchers write in their journal article. "The boulders have natural faces with no signs of cutting or chiselling. Similarly, we did not find any sign of arrangement or walls that delineate this structure."



Putting all the data together researchers found that the structure is cone shaped, about 230 feet (70 meters) in diameter and nearly 32 feet (10 meters) tall. It weighs an estimated 60,000 tons.

They say it is definitely human-made and probably was built on land, only later to be covered by the Sea of Galilee as the water level rose. "The shape and composition of the submerged structure does not resemble any natural feature. We therefore conclude that it is man-made and might be termed a cairn," the researchers write.

More than 4,000 years old?

Underwater archaeological excavation is needed so scientists can find associated artifacts and determine the structure's date and purpose, the researchers said.

Researcher Yitzhak Paz, of the Israel Antiquities Authority and Ben-Gurion University, believes it could date back more than 4,000 years. "The more logical possibility is that it belongs to the third millennium B.C., because there are other megalithic phenomena (from that time) that are found close by," Paz told LiveScience in an interview, noting that those sites are associated with fortified settlements.

The researchers list several examples of megalithic structures found close to the Sea of Galilee that are more than 4,000 years-old. One example is the monumental site of Khirbet Beteiha, located some 19 miles (30 kilometers) north-east of the submerged stone structure, the researchers write. It "comprises three concentric stone circles, the largest of which is 56 m (184 feet) in diameter."

An ancient city

If the third-millennium B.C. date idea proves correct it would put the structure about a mile to the north of a city that researchers call "Bet Yerah" or "Khirbet Kerak."

During the third millennium B.C. the city was one of the biggest sites in the region, Paz said. "It's the most powerful and fortified town in this region and, as a matter of fact, in the whole of Israel."

Archaeologist Raphael Greenberg describes it in a chapter of the book "Daily Life, Materiality, and Complexity in Early Urban Communities of the Southern Levant" (Eisenbrauns,

2011) as being a heavily fortified 74-acre (30 hectares) site with up to 5,000 inhabitants.

With paved streets and towering defenses its people were clearly well organized. "They also indicate the existence of some kind of municipal authority able to maintain public structures," Greenberg writes.

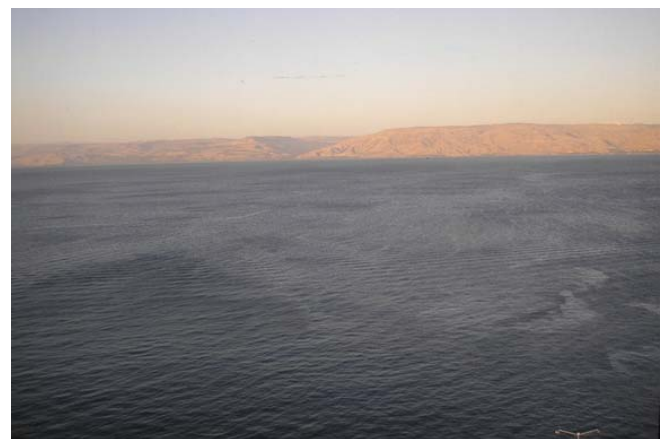
The research team says that, like the leaders of Bet Yerah, whoever built the newly discovered Sea of Galilee structure needed sophisticated organization and planning skills to construct it. The "effort invested in such an enterprise is indicative of a complex, well-organized society, with planning skills and economic ability," they write in their journal paper.

Paz added that "in order to build such a structure, a lot of working hours were required" in an organized community effort.

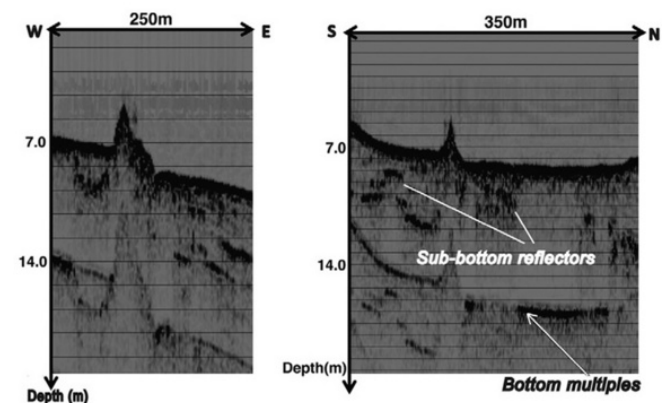
Future exploration

Paz said that he hopes soon that an underwater archaeological expedition will set out to excavate the structure. They can search for artifacts and try to determine its date with certainty.

He said that the Israel Antiquities Authority has a research branch capable of excavating it. "We will try to do it in the near future, I hope, but it depends on a lot of factors."



The Sea of Galilee near the old city of Tiberias. The newly discovered structure is located just to the south.

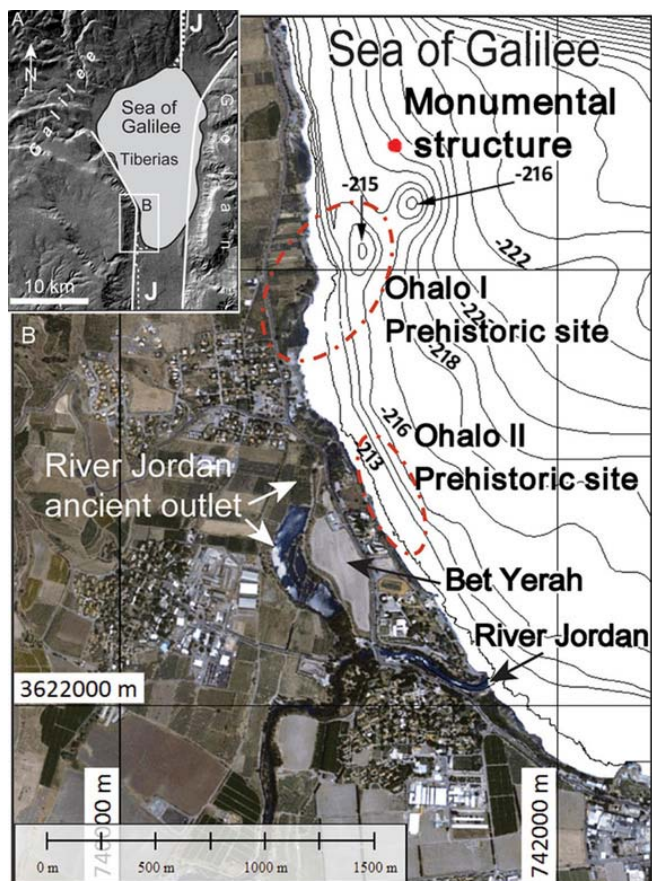


Radar imagery Compressed High Intensity Radar Pulse (CHIRP) provided the researchers with more information on the structure. It indicated that its "western face is somewhat steeper than the eastern part."

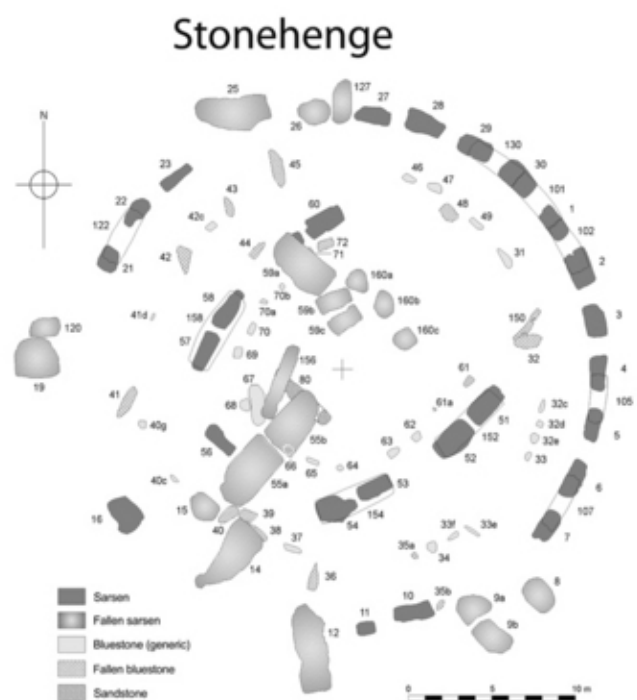


Perspective To put the structure's weight into perspective consider this - at 60,000 tons it is heavier than most modern day warships. In fact it weighs about the same as this ship, the now retired battleship USS New Jersey.

Divers investigate Scuba divers investigated the structure revealing that it is made of basalt boulders up to 3.2 feet (1 meter) long. The rocks are piled on top of each forming what appears to be a cairn. In this image an arrow points to a 4 inch (10 cm) fish beside the structure.



Close to ancient locations They also found that it is located about 1600 feet (500 meters) off the southwest coast of the sea. Several prehistoric sites are located nearby as is the ancient city of Bet Yerah which thrived more than 4,000 years ago.



More perspective To put the structure's 230 feet (70 meters) diameter in perspective consider this. The outer circle of Stonehenge (whose central layout is shown here) has a diameter of only about half that. Also the tallest stones of Stonehenge do not reach as high as the Sea of Galilee structure.

(Owen Jarus / [LiveScience](http://www.livescience.com) / EIN News, April 11, 2013, http://world.einnews.com/article/145722558/ujK6XNYqb1Bv7C8L?afid=777&utm_source=MailingList&utm_medium=email&utm_campaign=Breaking+News%3A+world351-thursday)



World's Coolest Subway Entrance

Located in the city center of Frankfurt, Germany is the subway entrance to Bockenheimer Warte (http://de.wikipedia.org/wiki/U-Bahnhof_Bockenheimer_Warte), one of the four major stations with interchanges on the Frankfurt Metro. The station was originally built in 1986 with a recent expansion completed in 2001. It is situated right by Goethe-University.

At this particular entrance an old tramway car appears to be bursting out from the concrete sidewalk. You can even check it out on Google Maps Street View (https://maps.google.com/maps?ll=50.119898,8.653627&spn=0.000272,0.000817&t=h&layer=c&cbll=50.119898,8.653627&panoid=xCn109mAPh4xfuu3wT05_Q&cbp=12,208.51,,0,2.94&z=21) where even more images are available!



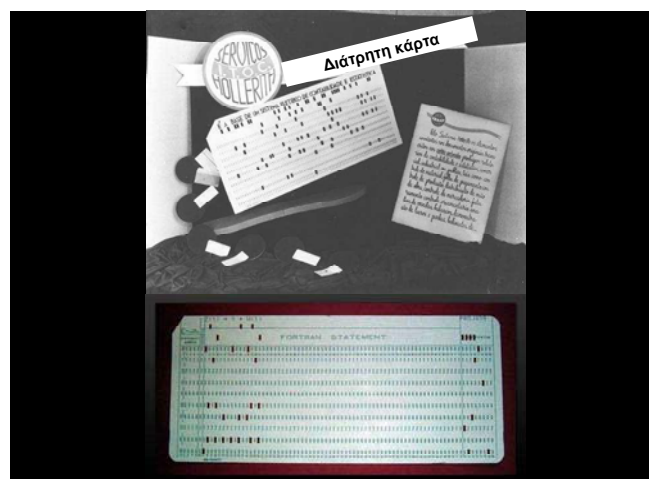
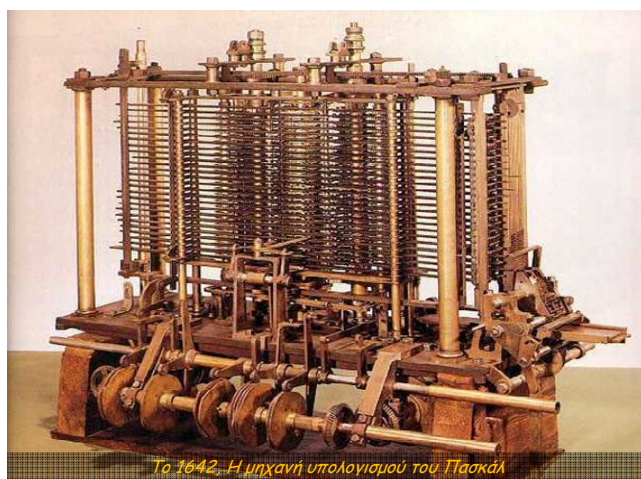
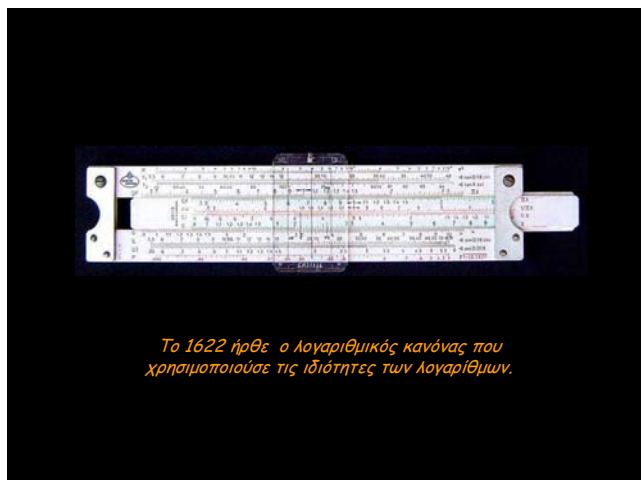
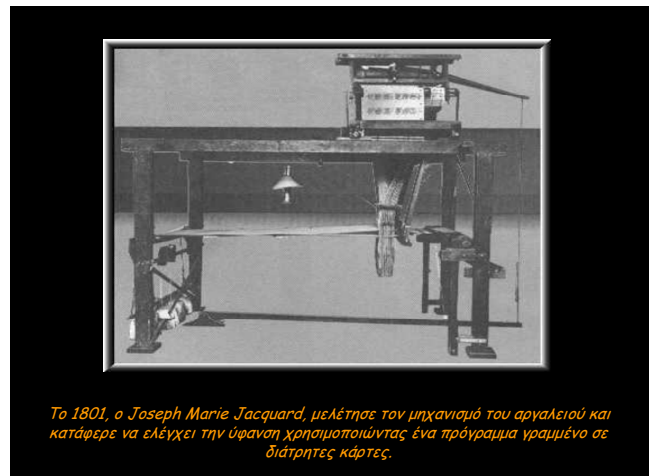
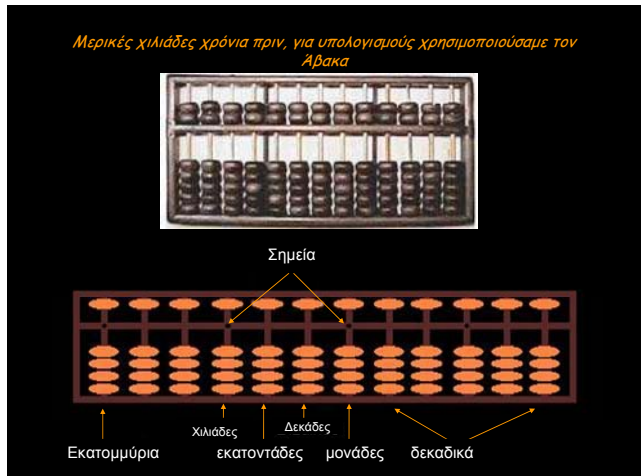
(http://www.flickr.com/photos/andra_mb/3319350517/)



(http://www.flickr.com/photos/a_l_gawith/4370970510/)



Η ιστορία του ηλεκτρονικού υπολογιστή

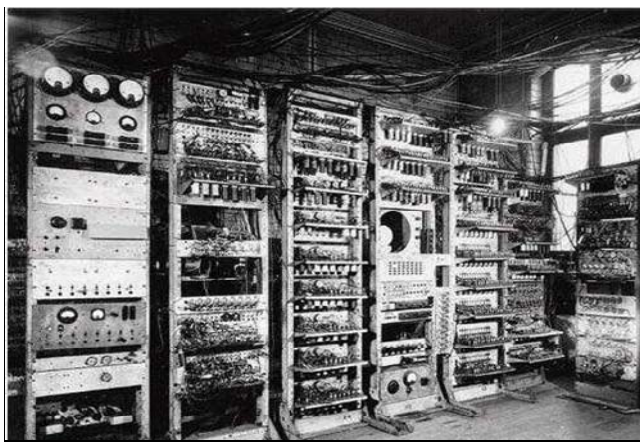


Το 1896, η επιτυχία του Hollerith δημιουργεί την Εταιρία μηχανικής πινακοποίησης (Κατάταξης σε πίνακα). Την *Tabulation Machine Company*,

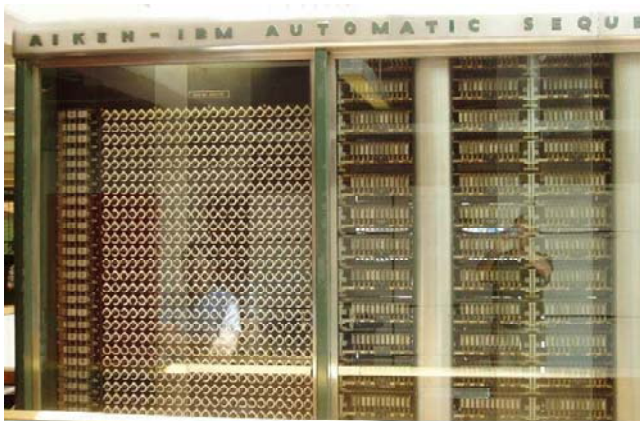


που μαζί με δύο άλλες εταιρίες σχηματίζουν την Εταιρία καταγραφής και επεξεργασίας πινάκων. Την *Computing Tabulation Recording Company*.

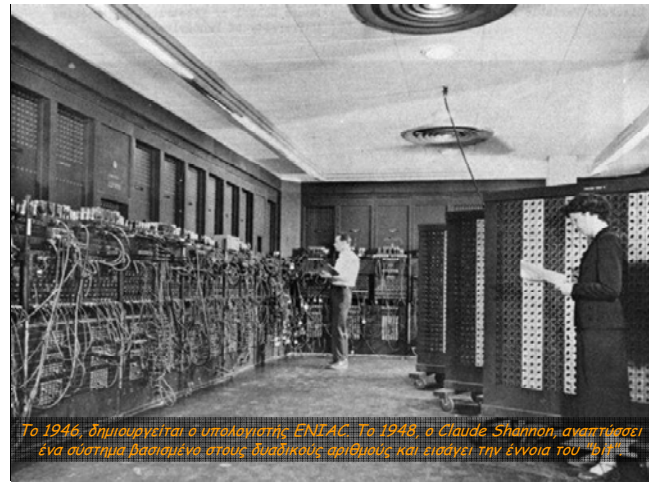
Το 1924, η CTRC αλλάζει το όνομά της σε *IBMC, International Business Machine Corporation*.



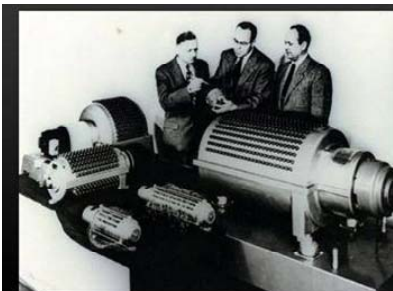
Το 1943, η IBM κατασκευάζει για το Αμερικάνικο ναυτικό την εξ ολοκλήρου ηλεκτρομηχανική συσκευή Mark 1. (17 m. μήκος, 2,5 m ύψος και 5 τόνους βάρος.)



Για χρήση στρατιωτικών σκοπών, ο πρώτος υπολογιστής περιείχε 750.000 εξαρτήματα συνδεδεμένα με περίπου 80 χιλιόμετρα καλώδια.



Το 1946, δημιουργείται ο υπολογιστής ENIAC. Το 1948, ο Claude Shannon, αναπτύσσει ένα σύστημα βασισμένο στους δυαδικούς αριθμούς και εισάγει την έννοια του "bit".



Εμφάνιση του μαγνητικού τύμπανου μνήμης.



Γλωσσάριο της δυαδικής μέτρησης. (Γλώσσα ηλεκτρονικού υπολογιστή)
- Το bit (binary digit) που μπορεί να είναι 0 ή 1 είναι η μικρότερη μονάδα πληροφορίας επεξεργάσιμη από τον υπολογιστή.

- Το byte που αποτελείται από 8 bits.

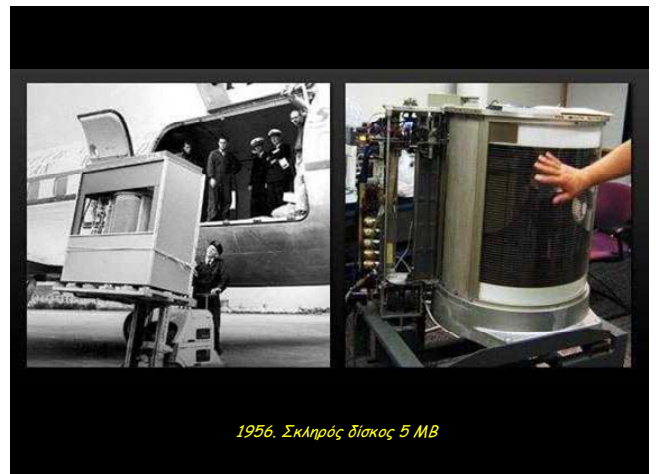
- Πολλαπλάσια : 1 kilobyte (KB) = 1.024 bytes, ή 8192 bits

1 Megabyte (MB) = 1.048.576 bytes

1 Gigabyte (GB) = 1.073.741.824 bytes



1954. Υπολογιστής IBM 650.



1956. Σκληρός δίσκος 5 MB

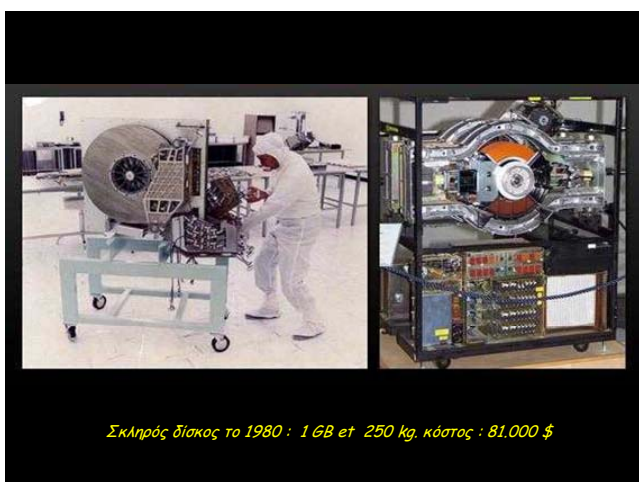


Η εποχή των προσωπικών υπολογιστών
Κασέτα ταινίας για την αρχειοθέτηση δεδομένων

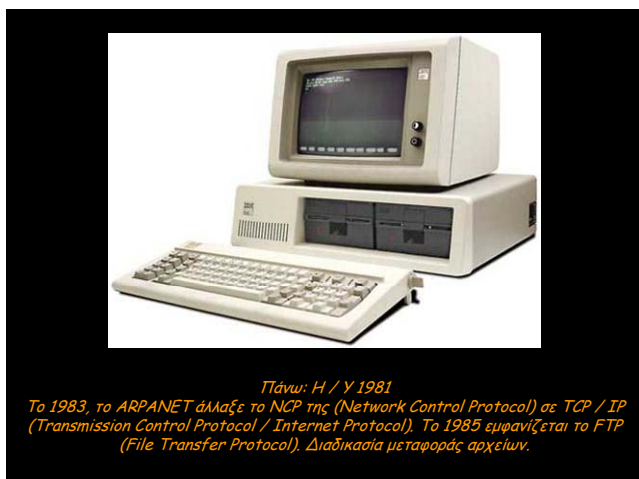
1967 - 1980
Δίσκος 8 ιντσών με 79,7 KB



Το 1969, κατά την διάρκεια του Ψυχρού πολέμου» μεταξύ ΗΠΑ και ΕΣΣΔ, η ARPA, "Advanced Research Projects Agency", τμήμα του υπουργείου άμυνας των ΗΠΑ, δημιουργεί ένα δίκτυο στο οποίο κυβερνητικές πληροφορίες μοιράζονται σε διαφορετικούς χώρους και όχι μόνο σε μια υπηρεσία. Αυτή είναι η αρχή του Internet.



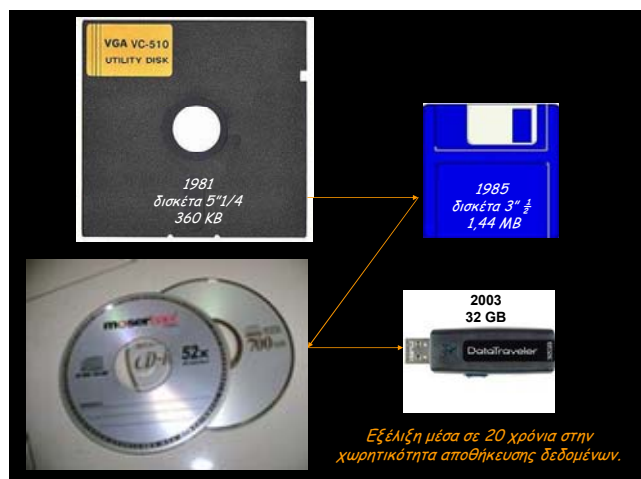
Σκληρός δίσκος το 1980 : 1 GB et 250 kg, κόστος : 81.000 \$



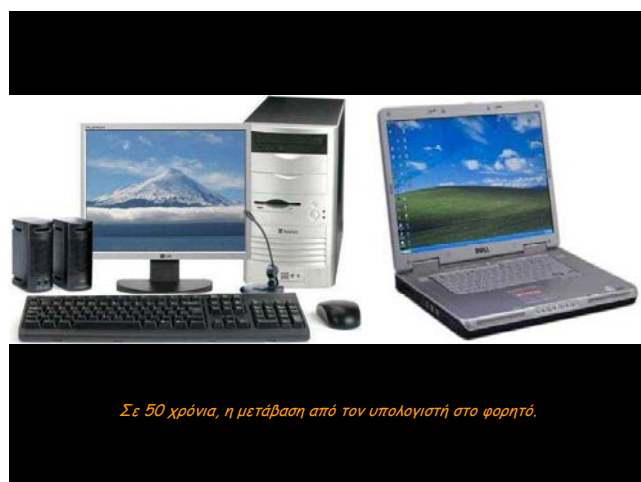
Πάνω: Η / Υ 1981
Το 1983, το ARPANET άλλαξε το NCP της (Network Control Protocol) σε TCP / IP (Transmission Control Protocol / Internet Protocol). Το 1985 εμφανίζεται το FTP (File Transfer Protocol). Διαδικασία μεταφοράς αρχείων.



Το CERN, «Conseil Européen pour la Recherche Nucléaire» (Ευρωπαϊκό συμβούλιο για την Πυρηνική έρευνα) προώθησε την ιδέα και δημιούργησε το « World Wide Web », ένα δίκτυο που συνδέει πανεπιστημιακά ερευνητικά κέντρα στα οποία οι χρήστες έχουν ενσωματωθεί από τις αρχές του 90.



Εξέλιξη μέσα σε 20 χρόνια στην χωρητικότητα αποθήκευσης δεδομένων.



Σε 50 χρόνια, η μετάβαση από τον υπολογιστή στο φορητό.

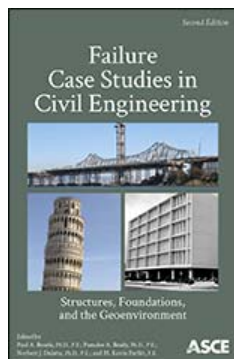


Η νέα εξέλιξη της ανθρωπότητας.
Αυτοκρατορία χωρίς βασιλιά ή βασίλισσα που δεν ξέρει ακόμα τη δύναμη της



*Η πιο γρήγορη κατάκτηση που ξέρουμε. Συνδέει ανθρώπους,
ομάδες και ιδιώτες,
ανεξάρτητα από τη φυλή, τη θρησκεία και τα έθιμα.*

ΝΕΕΣ ΕΚΔΟΣΕΙΣ ΣΤΙΣ ΓΕΩΤΕΧΝΙΚΕΣ ΕΠΙΣΤΗΜΕΣ



Structures, Foundations, and the Geoenvironment, Second Edition

Paul A. Bosela, Pamalee A. Brady, Norbert J. Delatte & Kevin Parfitt (Editors)

Sponsored by the Technical Council on Forensic Engineering of ASCE.

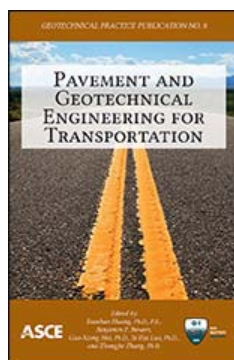
Failure Case Studies in Civil Engineering: Structures, Foundations, and the Geoenvironment, Second Edition, provides short descriptions of 50 real-world examples of constructed works that did not perform as intended. Designed for classroom use, each case study contains a brief summary, lessons learned, and references to key sources. This new edition, which replaces the 1995 classic edited by Robin Shepherd and J. David Frost, offers expanded descriptions, additional photographs and diagrams, and updated references. It also includes new case studies, such as the Alfred P. Murrah Federal Building, the Charles de Gaulle Airport Terminal, and the North Battleford, Saskatchewan, Water Treatment Plant.

Topics include:

- foundation failures;
- embankment, dam, and slope failures;
- geoenvironmental failures;
- bridge failures; and
- building failures.

This book supplies valuable resource material on typical failures that can be integrated into undergraduate engineering courses. Engineering professors and their students will use this book as the basis for class discussions, a starting point for further research, and a demonstration of how each failure leads to improved engineering design and safety.

(ASCE, 2013)



Pavement and Geotechnical Engineering for Transportation

B. Huang, B. F. Bowers, G-X. Mei, Si-Hai Luo, and Z. Zhang

Geotechnical Practice Publications (GPP) GPP 8

Selected papers from the First International Symposium on Pavement and Geotechnical Engineering for Transportation Infrastructure held in Nan-

chang, China, June 5-7, 2011. Sponsored by the Nanchang Hangkong University and the International Association of Chinese Infrastructure Professionals (IACIP) in cooperation with the Geo-Institute of ASCE.

Pavement and Geotechnical Engineering for Transportation contains 20 papers that represent the latest developments in the application of soil, rock, and paving materials to the study and application of geomechanics and transportation geotechnology.

Topics include pavement structure and subgrade preparation such as: the use of chemical additives and geogrid reinforcement; performance assessment of concrete and asphalt mixtures; mathematical models for the simulation of geotechnical problems; and evaluation of soil types in relation to slope failure, consolidation, and embankment behavior.

This Geotechnical Practice Publication focuses on the application of geomechanics in transportation and will be of interest to both geotechnical engineers and transportation professionals.

(ASCE, 2013)

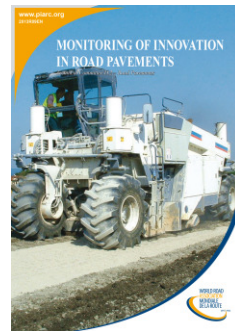


Quiet pavement technologies

Comité technique D.2 Chaussées routières / Technical Committee D.2 Road Pavements

Tyre-pavement noise fundamentals (mechanisms, main systems which act as source, mechanisms complexity and practical needs). Practical solutions (asphalt rubber friction course, poroelastic road surface, porous asphalt-single-layer, porous asphalt- two-layer, stone mastic asphalt, thin and ultrathin surfacing, surface dressing, porous concrete, exposed aggregate concrete, drag textures, diamond grinding, longitudinal tining). Finally, national and multi-national quiet pavement initiatives (European and multi-national overview, United States overview) were described.

(PIARC Ref. 2013R10EN, <http://www.piacr.org/en/order-library/19683-en-Quiet%20pavement%20technologies.htm>)



Monitoring of innovation in road pavements

Comité technique D.2 Chaussées routières / Technical Committee D.2 Road Pavements

This report examines road administrations and agencies policies for fostering, assessing and implementing innovation in road design and construction.

From an international survey, eight types of innovation policies were identified: adaptation of existing specifications ; agency led innovation, special organization processes ; technical agreements and certification programs ; value engineering proposals by contractors before and after contract bid ; end-performance and long-term warranty contracts ; PPPs and concession agreements. Lessons learned from the review of these policies are presented.

The focus of the study was placed on the review of recent changes in construction and maintenance of road pavements to identify where innovations have been introduced towards improving roadway durability, recycling and re-use of pavement materials.

In appendix a number of fact sheets present how different innovations have been introduced in various countries.

(PIARC Ref. 2013R09EN, <http://www.piarc.org/en/order-library/19603-en-Monitoring%20of%20innovation%20in%20road%20pavements.htm>)

ΗΛΕΚΤΡΟΝΙΚΑ ΠΕΡΙΟΔΙΚΑ



www.geoengineer.org

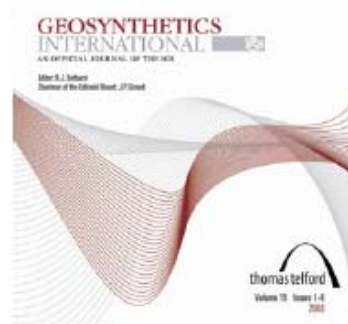
Κυκλοφόρησε το Τεύχος #99 του **Newsletter του Geoengineer.org** (Απρίλιος 2013) με πολλές χρήσιμες πληροφορίες για όλα τα θέματα της γεωτεχνικής μηχανικής. Υπενθυμίζεται ότι το Newsletter εκδίδεται από τον συνάδελφο και μέλος της ΕΕΕΕΓΜ Δημήτρη Ζέκκο (secretariat@geoengineer.org).



<http://library.constantcontact.com/download/get/file/1111082143825-60/2013-03-igs-news-a6-sm.pdf>

Κυκλοφόρησε το Τεύχος 1, Volume 29 των **IGS News**. Μεταξύ των θεμάτων περιλαμβάνονται:

- President's Corner
- IGS Awards: Call for nominations
- The new IGS Young Members Committee
- Richard Bathurst selected to deliver Giroud Lecture
- Conference Reports
- Conference Announcements
- Case Histories
- Case Studies



Geosynthetics International

www.thomastelford.com/journals

Κυκλοφόρησαν τα τεύχη αρ. 6 του 19^{ου} τόμου (Δεκεμβρίου 2012) και αρ. 1 και 2 του 20^{ου} τόμου (Φεβρουαρίου και Απριλίου 2013) του περιοδικού **Geosynthetics International**. Πρόσβαση μέσω των ιστοσελίδων <http://www.icvirtuallibrary.com/content/issue/gein/19/6> <http://www.icvirtuallibrary.com/content/issue/gein/20/1> <http://www.icvirtuallibrary.com/content/issue/gein/20/2>



Geotextiles & Geomembranes

www.geosyntheticssociety.org/journals.htm

Κυκλοφόρησε ο τόμος 37 (Απριλίου 2013) με τα παρακάτω περιεχόμενα:

A finite-discrete element framework for the 3D modeling of geogrid-soil interaction under pullout loading conditions, V.D.H. Tran, M.A. Meguid, L.E. Chouinard

Numerical study on stability analysis of geocell reinforced slopes by considering the bending effect, Iman Mehdipour, Mahmoud Ghazavi, Reza Ziaie Moayed

Confinement effect of geocells on sand samples under triaxial compression, Rong-Her Chen, Yu-Wen Huang, Feng-Chi Huang

Influence of elastic strains during plastic deformation of encased stone columns, Jorge Castro, César Sagaseta

Refined numerical modeling of a laterally-loaded drilled shaft in an MSE wall, Jie Huang, Jie Han, Robert L. Parsons, Matthew C. Pierson

Geosynthetic mattress: Analytical solution and verification, Wei Guo, Jian Chu, Shuwang Yan, Wen Nie

Behavior of sandy slopes remediated by EPS-block geofoam under seepage flow, Onur Akay, A. Tolga Özer, Garey A. Fox, Steven F. Bartlett, David Arellano

Geocomposite induced consolidation of clayey soils under stepwise loads, Jinchun Chai, Quang Nguyen Duy

Prestressed reinforced soil by geosynthetics – Concept and experimental investigations, C. Lackner, D.T. Bergado, S. Semprich

Technical Notes

Experimental study on water permittivity of woven polypropylene geotextile under tension, Yiping Zhang, Weichao Liu, Weiyun Shao, Yan Yang

A monolithic layered nonwoven–woven geotextile for use with drainage geocomposites in coal combustion residual projects, Dhani Narejo, Mengjia Li, Ed Zimmer, Yin Wu

Mechanical properties and damage analysis of jute/polypropylene hybrid nonwoven geotextiles, Amit Rawal, M.M.A. Sayeed

Πρόσβαση μέσω τις ιστοσελίδας

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

Keshav Ral Dhawan "Flat Jack Method for Measuring Design Parameters for Hydraulic Structures of the Koyna Hydro Electric Project in India", pp. 182-195

Bengt H. Fellenius, Nguyen Minh Hai "Large Diameter Long Bored Piles in the Mekong Delta", pp. 196-207

Navid H. Jafari, Timothy D. Stark, Scott Merry "The July 10 2000 Payatas Landfill Slope Failure", pp. 208-228

Ashish Juneja, Deblina Chatterjee, Rajendra Kumar "Embankment Failure in Residual Soils at Nivsar, Ratnagiri", pp. 229-251

http://casehistories.geoengineer.org/volume/volume2/issue3/issue3.html?utm_source=GeoNewsletter+%2399%2C+April+2013&utm_campaign=Geo+News+30+April+2013&utm_medium=email



http://www.itacet.org/Newsletter/15_2013/ITACET_NL_15_2013.php

Κυκλοφόρησε το Τεύχος Νο. 15 (Απρίλιος 2013) του ITACET Foundation με τα παρακάτω περιεχόμενα:

- President's address
- Editorial, Dr.-Ing. E. H. Martin Herrenknecht
- New Donors
- Training Session WTC 2013 Geneva
- Training Session in Riyadh
- Training Session in Mexico
- Coming soon
- Foundation scholarship
- Events realized
- The foundation at the EPFL Lausanne



International Journal of Geoengineering Case Histories

Κυκλοφόρησε το Τεύχος 3 του ISSMGE's International Journal of Geoengineering Case Histories με τα παρακάτω περιεχόμενα:

ΕΚΤΕΛΕΣΤΙΚΗ ΕΠΙΤΡΟΠΗ ΕΕΕΕΓΜ (2012 – 2015)

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