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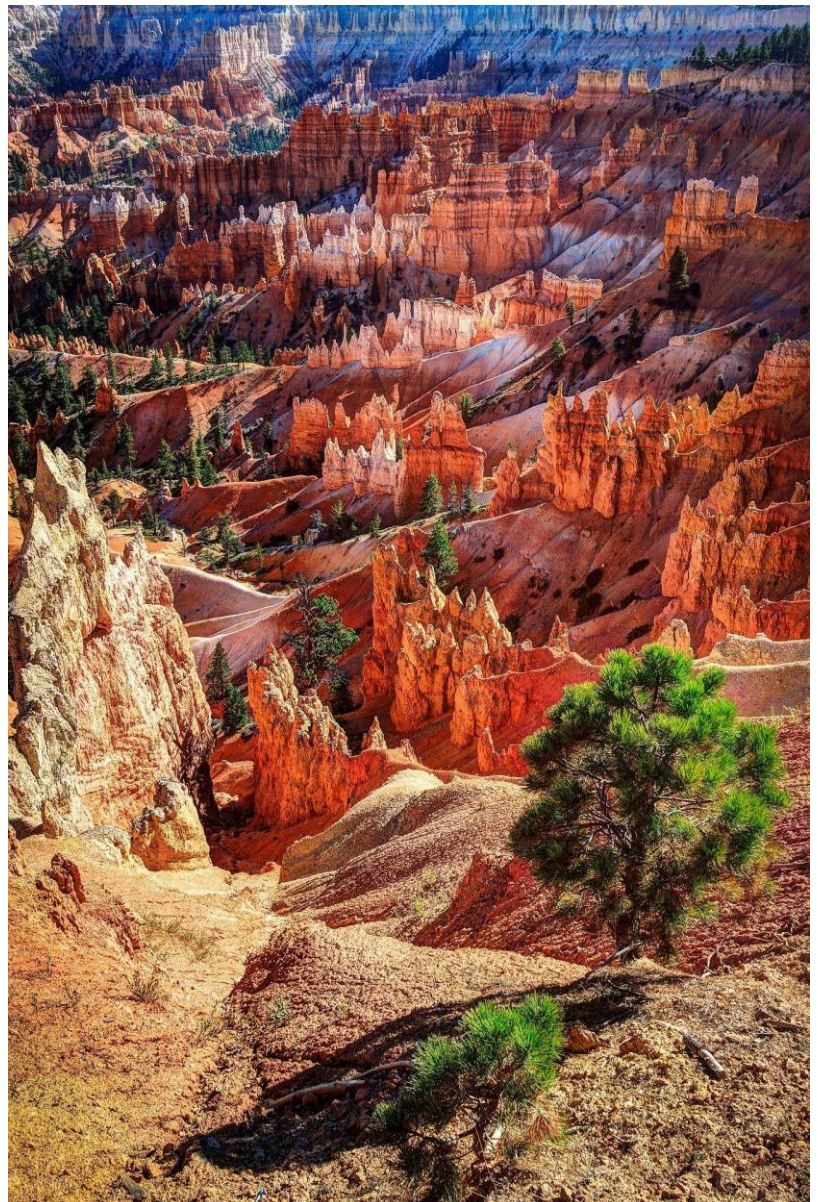
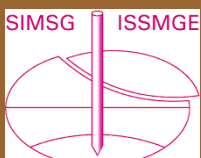


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& ΓΕΩΤΕΧΝΙΚΗΣ
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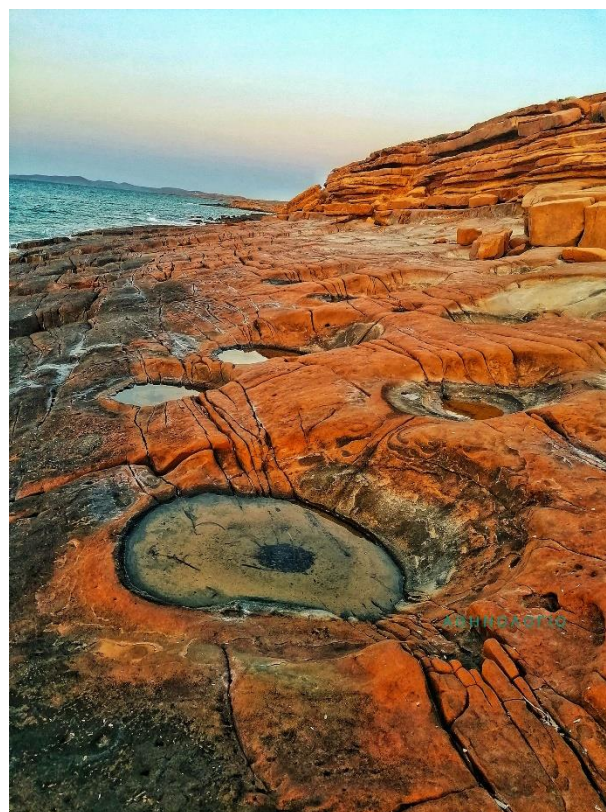


Bryce Canyon, Utah U.S.A.

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Λήμνος. Στα χνάρια του Ηφαίστου ...



Πόρτο Κατσίκι

Geology of Greece: How the Country's Beautiful Landscape Formed



A stunningly unique phenomenon of geology in [Greece](#): The Folded Marls near Agios Pavlos, on the island of Crete.

Greece and its geology are a wonder of nature, with the nation a paradise blessed with high mountains, blue seas, and over six thousand islands. But it's all a big geological accident, the result of millions of years of violent earth movements on a planetary scale.

Geology in Greece: in the beginning...

The story of Greece and its geology begins around 250 million years ago when the continents had all come together into one single land mass that geologists call Pangea.

The area that would one day become Greece lay on the southern shore of what would eventually become Europe and on the northern edge of a great ocean called Tethys. On the southern edge of Tethys lay the continent that would one day become Africa.

The Earth's crust is not all the same, nor is it a single unit. The crust making up the continents is very thick—30 km to 40 km (18.6 to 24.85 miles) thick—and thicker still under mountain ranges. The crust under the oceans is quite thin, however, at only around 7 km (4.3 miles) thick.

In addition, the crust is not one single unit but is broken up into various-sized chunks known as tectonic plates. These plates move relative to one another because they are literally floating on the deformable layer of the upper mantle beneath them in much the same way that a ship floats on the sea.

In some places, these plates are moving together, and where oceanic crust is pushed into continental crust, the thinner oceanic crust is forced beneath the thicker continental crust and down into the mantle, where it begins to sink and melt. Geologists call this type of plate boundary a subduction zone.

The Greek landscape and geology that we see today is here because of a subduction zone. Without it, Greece would simply not exist.

The compressive phase

Around 150 million years ago, the great continent of Pangea started to break up. The African plate began to move northwards, and the Tethys Ocean started to shrink. The northwards movement of Africa meant that the oceanic crust be-

neath Tethys was subducted under the southern edge of the continental crust of Europe.

As the oceanic crust under Tethys slid beneath the continental crust of Europe, all of the rocks that had formed on the ocean floor over many millions of years were scraped off by the leading edge of the European continent. These rock scrapings, which would have been hundreds of meters thick and many kilometers long, were piled up one on top of the other on the southern edge of Europe.

This rock pile (geologists call it a nappe) was likely many kilometers thick in the end. It contained all the rocks that would eventually form Greece's geology all piled up in the same place.



A thrust fault near Kavousi, Crete.

The photo shown here is of a large sea cliff near Kavousi on Crete. The rocks on the left are a gray color with clearly defined horizontal layers. Those on the right are a greenish brown color with a nearly vertical layering. Clearly, this cliff is composed of two very different rock types.

The rocks on the left are limestones while those on the right are phyllites. The compressional forces of the subduction zone forced the phyllites over and on top of the limestones. The junction between the two (known as a thrust fault) lies roughly in the center of the picture, running diagonally up from right to left.

Millions of years of weathering and erosion have ground both sets of rocks down so that to the casual observer today, they appear to be a single unit.

The tensional phase

Around 65 million years ago, the continent of Africa finally collided with the continent of Europe and closed the Tethys Ocean forever. It would eventually be reborn as the Mediterranean Sea.

When two continental plates come together, there is no subduction since they are both too thick. Instead, the continents themselves are deformed, and mountains are created. In the west, this collision formed the Alpine mountains while in it formed the Balkan mountains in the east.

In these mountain areas, the continental collision destroyed the subduction zone, but in the area in between, where modern Greece lies, the subduction zone remained active.

Even though Africa could no longer move northwards as fast as was previously the case, the oceanic plate in the area of Greece was still sinking into the mantle. As it sank, the subduction zone itself rolled back southwards. This rollback of the subduction zone put the nappe pile under enormous tension.

When rocks are placed under tension, they break, causing normal faults. One side of the fault moves downwards on a sloping surface to relieve the tension. Normal faults often occur in parallel and in swarms leaving alternating areas of high ground with lower ground in between.

The rollback of the subduction zone caused massive parallel swarms of normal faults in the nappe pile. Because the subduction zone is fixed in the east and in the west, the rollback created an arc that is ever expanding as the rollback progresses.



A normal fault in the Corinth Canal.

The photo above is of a small section of the north wall of the [Corinth Canal](#). The rocks here are nicely layered; we can see yellow, white, red, and black layers.

The two diagonal lines in these rocks are normal faults, breaks in the rocks caused by tensional forces due to the rollback of the subduction zone. The rocks to the right of each fault have dropped down relative to the rocks on the left; this is clearly visible in the displacement of the colored layers of rock.

The total vertical displacement here is only a few meters, but in the massive regional faulting that shaped Greece and its geology, displacements are measured in kilometers.

The modern topography of Greece

Looking at a topographical [map of Greece today](#), you can see how a subduction zone, starting roughly in the area of the north Aegean and rolling back southwards in an expanding arc would create the “ripped” and “torn” appearance of Greece today. You can also see how regional faulting created the alternating series of high mountain ranges and islands, with lower plains or sea in between.

The Pindus Mountains, for example, the backbone of mainland Greece, run southeastward in a gently curving arc. On both sides are lower plains. These mountains, like so many others in Greece, are bounded by massive regional faults.

The expanding arc of the subduction zone caused extensive local faulting, too. On Crete, for example, all of the mountain ranges are bounded by faults. They stand tall because the ground around them has dropped due to faulting. Such local, fault-bounded structures are widespread in Greece.

What about the volcanoes?

There are many volcanoes in Greece—on Santorini, Milos, Nisiros, Methana, and Sousaki among others. Some are [ac-](#)

[tive, like Santorini](#); most are dormant, like Milos, and one or two are extinct, like Sousaki.

If you look closely, all the Greek volcanoes sit on an arc that parallels the arc of the subduction zone but is north of it by about 100 km.

As the oceanic plate is subducted deep into the mantle, it begins to melt. Magma from the melting plate rises to the surface where it erupts, forming volcanoes.

The hot springs of Thermopylae (of Spartan fame) sit at one end of this volcanic arc; the hot springs of Pamukkale in Turkey sit at the other. In between are all the Greek volcanoes, formed above the spot where, deep in the mantle, the subducted oceanic crust is melting.

Greece’s geology continues to change

The subduction zone today runs in a great arc down the western side of the Ionian Islands, around the Peloponnese and [south of Crete](#), and then curves up northwards again past Kasos, Karpathos, and Rhodes.

Greece and its geology as we see these today are not an end point, however; this is simply the way things are right now.

The subduction zone is still active, and the oceanic plate is still descending as Africa creeps northward. The subduction zone is still rolling back, and the arc is still expanding. That’s why we have so many earthquakes in Greece—we’re still being torn apart by tectonic forces.

We don’t need to worry about this too much though, as these geological processes happen on a timescale that is measured in millions of years. Chances are, that beautiful Greek beach in the travel brochure will still be there when you arrive.

(Tony Cross / GREEK REPORTER, 30.06.2022, <https://greekreporter.com/2022/06/30/geology-greece-countrys-beautiful-landscape-formed>)

It's amazing how much the face of Earth has changed over time

Orogenies are the process of building mountains. These systems are responsible for geological hazards (earthquakes and volcanoes), they help drive geochemical cycles, and affect climate change and the nutrient supply for life.

This video walks through 26 orogenies that have left a significant imprint on the continental crust. It shows their geographic locations today and in the past.

This work is related to our recent paper: New models of global geological provinces and tectonic plates in Earth Science Reviews, <https://doi.org/10.1016/j.earscirev.2...>



<https://www.youtube.com/watch?v=N--HPPmcG-o>

New Maps of Global Geological Provinces and Tectonic Plates

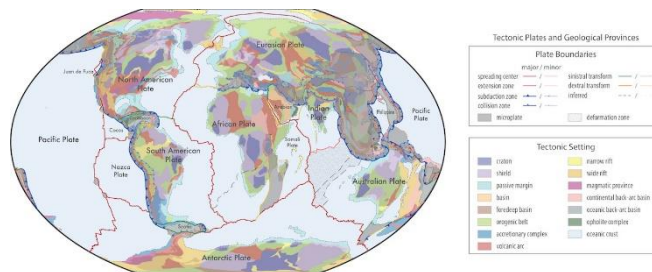
Derrick Hasterok, Jacqueline A. Halpin, Alan S. Collins, Martin Hand, Corné Kreemer, Matthew G. Gard, Stijn Glorie

Abstract

Accurate spatial models of tectonic plates and geological terranes are important for analyzing and interpreting a wide variety of geoscientific data and developing compositional and physical models of the lithosphere. We present a global compilation of active plate boundaries and geological provinces in a shapefile format with interpretive attributes (e.g., crust type, plate type, province type, last orogeny). The initial plate and province boundaries are constructed from a combination of published global and regional models that we refine using a variety of geoscientific constraints including, but not limited to, relative GPS motions, earthquakes, mapped faults, potential field characteristics, and geochronology. These new plate model show improved correlation to observed earthquake and volcano occurrences within deformation zones and microplates, compared to existing models, capturing 73 and 80% of these criteria, respectively. Deformation zones and microplates only account for 16% of Earth's surface area. We estimate 57.5% of the Earth's surface is covered by oceanic crust, which is a slight increase relative to the most recent seafloor age model. The model of last orogenies agrees well with peaks in the globally summed geochronology data. There is room for improvement in future editions of our global plate and geologic provinces model where basins, ice, or lack of geological data fidelity obscure bedrock geology, particularly in the eastern Central Asian Orogenic Belt, much of Africa, East Antarctica, and eastern Australia. Additionally, some province types—orogens, shields, and cratons that are homogenized within our global scheme—can likely be partitioned into smaller terranes with

more precise geodynamic attributes. Despite some of these shortcomings, the digital maps presented here form a self-consistent data standard for adding spatial metadata to geoscientific databases. The database is available on GitHub where the geoscience community can provide updates to improve the models and their contemporaneity as new knowledge is acquired. The files are also released in formats suitable for use in Generic Mapping Tools and GoogleEarth.

Graphical abstract



Introduction

The structural architecture, tectonic environment, and temporal evolution of rocks at the surface of the Earth is frequently correlated with the chemical and physical characteristics of the enclosing lithosphere (Gard et al., 2019, Artemieva, 2019, Tang et al., 2020, Tetley et al., 2020). As a result, it is useful to have spatially accurate maps of geologic provinces and terrane boundaries that encompass a pragmatically uniform set of common geological characteristics for comparative global studies. Such maps also form the foundation for accurate plate reconstructions (Merdith et al., 2021). While there are some regional models of tectonic provinces that are digital (Artemieva, 2006, Laske et al., 2013), there are few accurate global models easily accessible to the geoscience community built on a multiplicity of comparative attributes that approach self-consistency.

In this paper, we present two basic models: (1) a global set of geologic provinces and (2) a model for present-day plate boundaries. Both models are presented in a vector format with accompanying metadata that can be used to improve and simplify the process of global tectonic data analysis and/or modeling across a diverse range of geoscientific phenomena. These models have been produced using a wide variety of geologic and geophysical data and have been partially validated, wherever possible, using igneous and metamorphic age dates allied with additional geophysical datasets. Our hope is these models can be used as a data standard for common classification across the variety of geological databases that currently exist. The global models presented below are freely available in open-source and form a basic digital architecture that can be progressively updated as geological data and interpretations continue to improve.

...

<https://doi.org/10.1016/j.earscirev.2022.104069>Get rights and content

Ensuring face support and control in soft ground urban tunnels: FEM validation

Spyridon Konstantis, George Prountzopoulos, Panagiotis Spyridis

Abstract

When designing and constructing a tunnel in an urban setting with the use of a closed face Tunnel Boring Machine (TBM), the objective is to ensure both the tunnel face stability and the control of induced ground deformations within predefined, acceptable limits. Unless the exerted active face pressure will match the in situ ground stresses, there will be ground deformations taking place in the advance core, i.e., face extrusion and pre-convergence, resulting in settlements or heave for active pressure lower or higher than the in situ stresses, respectively. This article presents the validation through finite element method (FEM) of an analytical methodology that can be applied on soft ground urban tunnels to assess the level of active face support to be considered in numerical analysis, to ensure elastic relaxation in the advance core and thus effective ground deformation control. The methodology combines the classic Anagnostou and Kovari method with the Convergence-Confinement method for face support proposed by Aristaghes and Autuori. In the current article, the methodology is described in detail and subsequently validated through three-dimensional FEM analyses. The article concludes with a discussion on the results and the applicability range of the methodology.

First published: 03 June 2022,

<https://doi.org/10.1002/geot.202100096>

Geomechanics and Tunnelling, [Volume15, Issue3](#), June 2022, Pages 317-326

ΝΕΑ ΑΠΟ ΤΙΣ ΕΛΛΗΝΙΚΕΣ ΚΑΙ ΔΙΕΘΝΕΙΣ ΓΕΩΤΕΧΝΙΚΕΣ ΕΝΩΣΕΙΣ



**International Society for Soil Mechanics and
Geotechnical Engineering**

**ISSMGE News & Information Circular
June 2022**

<https://www.issmge.org/news/issmge-news-and-information-circular-June-2022>

1. ISSMGE COUNCIL MEETING SUNDAY 1ST MAY 2022

At the Council Meeting in Sydney, Dr Marc Ballouz was elected as the next President of ISSMGE for the period 2022 - 2026. The Vice-Presidents will be:

Africa - Professor Marawan Shahien
Asia - Professor Keh-Jian Shou
Australasia - Mr Graham Scholey
Europe - Professor Lyesse Laloui
North America - Professor Walter Paniagua
South America - Professor André Assis

Other key points from the Council Meeting are:

The next quadrennial international conference (21 ICMSGE) will be held in Vienna, Austria 28 June - 3 July 2026.

The next Council Meeting will be in Nur-Sultan, Kazakhstan, 14-18 August 2023, on occasion of the XVII Asian Regional Conference.

2. ISSMGE BULLETIN

The latest edition of the ISSMGE Bulletin (Volume 16, Issue 2, April 2022) is available from the website <https://www.issmge.org/publications/issmge-bulletin/vol-16-issue-2-april-2022>

3. ISSMGE FOUNDATION

The next deadline for receipt of applications for awards from the ISSMGE Foundation is the 30th September 2022. Click [here](#) for further information on the ISSMGE Foundation.

4. CONFERENCES

For a listing of all ISSMGE and ISSMGE supported conferences, and full information on all events, including deadlines, please go to the Events page at <https://www.issmge.org/events>. However, for updated information concerning possible changes due to the coronavirus outbreak (ie. postponements, cancellations, change of deadlines, etc), please refer to that specific events website.

As might be expected, many events have been rescheduled and we update the Events page whenever we are advised of changes.

The following are events that have been added since the previous Circular:

ISSMGE Events

WORKSHOP ON EUROCODE 7 - 16-06-2022 - 17-06-2022 Online, Colombo, Sri Lanka; Language: English; Organiser: Sri Lankan Geotechnical Society (SLGS); Contact person: Prof. Udeni Nawagamuwa; Address: University of Moratuwa; Phone: +94773595177; Fax: +94112502611; Email: nawagamuwa@gmail.com; slgssecretariat@gmail.com; Website: <http://www.slgs.lk>

NON-ISSMGE Events

8th INTERNATIONAL CONFERENCE ON DEBRIS FLOW HAZARD MITIGATION - 26-06-2023 - 29-06-2023 Politecnico di Torino, Italy, Turin, Italy; Language: English; Organiser: Politecnico di Torino, Italy; Contact person: Symposium Srl; Address: via Gozzano 14; Phone: +39 011 921 14 67; Email: info@symposium.it; dfhm8@symposium.it; Website: <http://www.dfhm8.polito.it>

CAPG has a great time in Sydney!

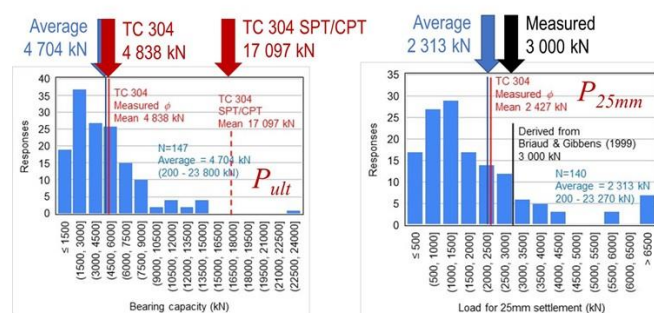
The Corporate Associates Presidential Group extends its sincere thanks and congratulations to Australian Geomechanics Society, the Organising Committee and the Conference Organisers (ICMS Australia) on a highly successful 20th International Conference on Soil Mechanics and Geotechnical Engineering held in Sydney in early May this year. It was a remarkable achievement under very difficult and changeable circumstances. Well done to all.

The conference provided an opportunity for members the CAPG, the industry arm of the ISSMGE, to interact and participate in a number of CAPG sponsored sessions.

Are we overdesigning should be worried?

Since 2018, the CAPG has been running a survey to assess the extent of overdesign in geotechnical engineering practice. The survey was based on 10 simple geotechnical design problems including footings, piles slopes and retaining walls. An analysis of the 237 responses received from 40 countries was presented in a paper by Peter Day and Jean-Louis Briaud during a plenary session on the opening day of the conference. Many of the problems were based on full-scale load tests carried out at the National Geotechnical Testing Site at Texas A&M from whence the geotechnical data was obtained. An example of the responses received is given below.

Problem SAND 1 – Vertically loaded spread footing



The overall conclusion, following consideration of all ten problems was that, on average, we are OK. However, we should be very concerned about the extreme range of results. Peter Day reiterated the message given in his 2017 Terzaghi Oration that the ISSMGE needs to pay as much attention to the implementation existing knowledge as it does to the creation of new knowledge. More state-of-practice papers are needed.

For anyone who would like to take the analysis of results further, the full results of the survey are available at <https://www.issmge.org/corporate-associates/downloads>. The paper appears on pages 511 to 529 of Volume 1 of the conference proceedings.

Innovation and Achievements in Geotechnical Engineering Practice

In May 2020, the CAPG issued a call to its members for submission of abstracts dealing with innovation and achievements in geotechnical engineering practice. Twenty-two abstracts were received, 15 of which were accepted. This resulted in twelve papers which are included in pages 5151 to 5218 of Volume 2 of the conference proceedings.

Due to the large number of authors who attended in person, the Organising Committee granted the CAPG two consecutive, in person, parallel sessions on the final morning of the conference during which there were nine live presentations and one virtual presentation.



Dena Gabbassova (Tetra Tech Coffey) and Yuli (Chaido) Doulala-Rigby (Tensar International) chairing the CAPG Parallel Sessions.

The papers covered a wide range of topics including new design methods, innovative construction techniques, offshore foundations, digital transformation and efficient test equipment. At the end of the session, the audience were invited to participate in an online poll to select the two presentation that made the most significant contribution to geotechnical engineering practice.

The CAPG is glad to announce that Dar-Rocsciences innovative tool on shallow foundations, presented by Dr. Roger Estephan (Director of the Geotechnical and Heavy Civil Engineering Department at Dar) obtained the highest vote for their paper A new design tool for shallow foundations offering enhanced accuracy, reduced design time, and cost savings.

The second award, by a narrow margin, went to Chaido (Yuli) Doulala-Rigby (Chief civil engineer at Tensar International Limited) for her paper *Surf Snowdonia: how geogrids brought waves to inland Wales, UK*. This paper describes the innovative use of geogrids to reduce differential settlements of an embankment around a wave pool built on alluvial soils.



Winners of the best presentation awards, Dr Roger Estephan and Yuli Doulala-Rigby

CAPG and the Launch of the ISSMGE Time Capsule

The ISSMGE Time Capsule project is an initiative of Sukumar Pathmanandavel, Co-Chair of the CAPG. Its purpose is to capture past, current and future issues in Geotechnical Engineering. The Time Capsule consists of contributions from Past Presidents of the ISSMGE, Member Societies, Technical Committees and Corporate Associates, all of which are stored in virtual form on <https://www.issmge.org/the-society/time-capsule>.



A panel session during the launch of the ISSMGE Time Capsule in Sydney

The CAPG is pleased to have received contributions from nine Corporate Associates in which they showcase their capabilities and achievements. Additional contributions are still being accepted via the Contacts tab in the Time Capsule web page.

The CAPG congratulates Sukumar Pathmanandavel and the Time Capsule Project Design Team on a remarkable achievement which has initiated dialogue at all levels of ISSMGE membership.

ISSMGE IT Administrator / Corporate Associates / 23-06-2022

Second TC306 Geotechnical Engineering Education post

A new GEE post (GEE = Geotechnical Engineering Education) has been uploaded on [TC306's website](#) (menu item: GEE posts).



The post reviews online educational material (3-5 minute videos), named geo-engineering pop-quizzes by their originator, Prof. Tim Stark. While reading the post, please take note of its many desirable for a GEE post features:

- a) it is a product of group work (common feature of all GEE posts),
- b) it reviews issues related to both educational method and geotechnical content,
- c) it does not concern work of the author of the GEE post,
- d) the review was a TC306 initiative (Prof. Stark was only notified of it),
- e) the review is critical (definition of critical from Webster: exercising or involving careful judgment or judicious evaluation), i.e. it mainly highlights the strong features of the video collection, but also suggests improvements.

Michele Calvello / [TC306](#) / 30-06-2022



News

<https://www.isrm.net>

6th ISRM Young Members' Seminar (YMS) on 28 June 2022-06-08

The ISRM Young Members' Seminar (YMS) Series is a new ISRM Young Members Group initiative. It consists of a series of virtual events with the goal of providing a global platform for ISRM young members to share knowledge, experiences, and ideas. [More details on the YMS are available on this page.](#)

After five very successful editions, the 6th ISRM Young Members' Seminar will take place on 28 June at 7 P.M. GMT (9:00 SAST and 16:00 KST), with two speakers, from Korea and South Africa:

- Extended Finite Element Procedures for the Analysis of Reinforced Dual-Permeable Rock Media - Dr. Yashwanth Kumar Gujjala (University of Sejong - South Korea)
- A probabilistic-based approach to rock slope stability analysis in open-pit mine using numerical modelling - Mr. Lewis Mathe (University of Johannesburg - South Africa)

You can join using the Zoom link created for each Seminar and you can participate in the question and answers period. The Seminars will also be live-streamed to the [ISRM YMs YouTube channel](#), where they will be stored. [Click here to download the flyer.](#)

Stay tuned for details on the 6th edition from the YMS organizing committee.

Sevda Dehkhoda
Chair of the ISRM Young Members Committee

38th ISRM Online Lecture by Prof. Yingxin Zhou is online 2022-06-23

For the 38th ISRM Online Lecture, the ISRM invited Prof. Yingxin Zhou, Senior Consultant with Deeptek Pty Ltd. The title of the lecture is "The Rock Engineering Process (for Cavern Construction)". It was broadcast on the 23rd June 2022, 10 A.M. GMT [in this page](#) and will remain online.

15th ISRM International Congress 2023, Salzburg - Abstract submission deadline is now 31 October 2022-06-30

Due to several reasons, the organizing team has decided to extend the submission deadline for abstracts to 31 October 2022!

We look forward to your contributions and encourage especially young engineers and scientists to actively participate and to submit papers.

The congress will be held in Salzburg, Austria, from 9 to 14 October 2023. On the congress homepage you will find more information: www.isrm2023.com

38th ISRM Online Lecture - 23rd June - Prof. Yingxin Zhou

Dear ISRM Members

For the 38th ISRM Online Lecture, the ISRM invited Prof. Yingxin Zhou. The title of the lecture is "The Rock Engineering Process (for Cavern Construction)". It will be broadcasted on the 23rd June 2022, 10 A.M. GMT at www.isrm.net.

Dr Zhou is a Senior Consultant with Deeptek Pty Ltd. Prior to joining Deeptek, he was Head Engineering (Underground Facilities) with the Defence Science and Technology Agency (2013 to 2021) and concurrently Assoc (Adj) Prof with the Nanyang Technological University (2011 to 2018) in Singapore. He served as ISRM Vice President for Asia (2011-2015) and first President of the ISRM Commission on Rock Dynamics (2008-2011).



Dr Zhou has more than 30 years of experience in research, engineering and teaching in rock engineering and underground space development. He played leading roles in several major rock engineering and research projects and served as technical advisor to many government ministries in Singapore. He led the rock engineering and technology development for the pioneering underground ammunition facility in Singapore and developing new safety standards for underground ammunition storage which have been adopted by NATO.

Dr Zhou received the Defence Technology Prize 2018 Individual (Engineering) Award and was featured twice in the Institute of Engineers Singapore (IES) Who's Who in Engineering Singapore in 2013 & 2020. He was a key member of the winning teams for the IES Prestigious Engineering Achievement Awards 2004 and the IES Top 50 Engineering Feats 2016.

Dr Zhou is a Fellow of the ISRM and Fellow of the Academy of Engineering Singapore. He is currently a Director (Asia) and Board Member of the Associated research Centers for the

Urban underground Space, and member of the Editorial Board for the International Journal of Tunnelling & Underground Space Technology. He has authored/co-authored more than 100 technical papers, 8 books and conference proceedings as editor or co-editor, and delivered many keynotes and invited lectures covering topics in rock mechanics, rock dynamics, and underground space. He led the efforts in publishing the first ISRM Suggested Methods for rock dynamic testing in 2012.

The lecture will remain online so that those unable to attend at this time will be able to do it later. As usual, the attendees will be able to ask questions to the lecturer by e-mail during the subsequent five days. All online lectures are available from this page.



Scooped by ITA-AITES #69, 7 June 2022

[Bengaluru: Terrain to boulders, building metro tunnel no mean feat | India](#)

[Broadway Subway nears official start of tunnelling using boring machines | Canada](#)

[Silvertown Tunnel 'eye' lifted into place | UK](#)

[Stonehenge tunnel preferred bidder announced | UK](#)

[Austrian Koralm tunnel is now structurally complete](#)

[Lisbon Metro awards €73.5m Circular Line construction contract | Portugal](#)

[Kuala Lumpur to get underground storage tunnel to prevent flash floods | Malaysia](#)

[Bavarian road tunnel opens to traffic | Germany](#)

[Addressing HK's land shortage requires using underground spaces | China](#)

[Pune Metro chugs along, excavation work of 12 km underground tunnel completed | India](#)

Scooped by ITA-AITES #70, 21 June 2022

[Fehmarnbelt tunnel achieves dredging milestone | Germany-Denmark](#)

[Saudi giga project NEOM awards major tunnelling contracts for transportation and utility infrastructure | Saudi Arabia](#)

[Semmering Base Tunnel achieves first breakthrough | Austria](#)

[HS2 starts work on first innovative green tunnel | UK](#)

[Japan's tunnel boring machines for philippine subway lowers underground | Philippines](#)

[Pragati Maidan tunnel, 5 underpass: Now, a smooth commute on Ring road and Mathura road | India](#)

[Explore the tunnels created for Auckland's City Rail Link | New Zealand](#)

[Breakthrough at first Koper-Divača rail track tunnel | Slovenia](#)

[Train tunnel extension at Atlanta airport will improve transport times | United States of America](#)

[Underground rock cavern hydrogen storage facility inaugurated in Luleå | Sweden](#)



Small diameter tunnel excavation and secondary lining construction methodologies at Thames Tideway Central

Speakers: Jaime Sevilla, Juan Mendez, Jorge Rubio

Thursday 16th June 2022 at 18:30 hrs [UTC+1]



As part of the Thames Tideway Tunnel scheme, the FLO team (Ferrovia-Laing O'Rourke JV) have completed a significant number of small diameter connection tunnels and culverts excavated using SCL techniques. The tunnels ranged from 3.1m to 5.8m in diameter and 12m to 250m in length. An in-situ concrete secondary lining was subsequently completed in the tunnels. The presentation will highlight the different equipment and methodologies employed for both operations as well as the synergies and efficiencies obtained across the different sites. The speakers will also briefly present an example of a very interesting large diameter open face pipe jacking completed in a tidal environment at the Albert Embankment worksite.

This is an in-person event which can also be streamed online at: <https://youtu.be/q7ljJAAZiZ4>



Introducing CSM2020 – Discrete Event Simulation Model for Predicting TBM Utilization

Anuradha Khetwal, PhD

Tuesday 31st May 2022 at 17:00 to 18:00 hrs - ONLINE

Tunnel Boring Machines (TBM) is perhaps the most efficient method for tunnel excavation, as they have become the dominant mode and method of tunneling worldwide. The primary performance indicator for TBMs is the average daily advance rate (AR) which is a product of the rate of penetration (ROP) and utilization (U). While there are various models for estimation of machine ROP with acceptable levels of accuracy and reliability, the models for prediction of machine utilization are often not sufficiently accurate as they do not include many of the critical input information.

Simulation of tunnel activities considering TBM to be a tunnelling factory can be a reliable method for estimation of TBM utilization factor. In this study, CSM2020 is developed to model tunnelling activities and downtimes using a discrete event simulation approach. The results of the CSM2020 model were verified by comparing the estimated utilization with that of the recorded TBM utilization at the job sites, broken down by formations and reaches of the tunnel. The impact of interdependencies of various tunnelling activities on machine utilization was assessed to identify the critical activities that might act as bottlenecks in the excavation process. The model proved to be a promising approach with the capability to incorporate site-specific conditions. The model can be used as a quantitative approach for the optimization of tunneling operation and selection of TBMs.

Online Lecture - Book your place at: BTSYM Workshop.

Mumbai Metro, Sahar Road Crossover

Speakers: Thomas Macgowan and Robin Swift

Thursday 9th of June 2022 at 18:00 to 19:00 hrs, London
ICE



The Sahar Road Crossover Cavern (SRCC) is a stepped profile cavern on the Mumbai Metro Line 3 project, and comprises 6no. different cross sections, symmetrical about the middle of the cavern. The original design called for a conventionally reinforced, cast-in-situ secondary lining, though given the number of geometrical sections and complexity of staging the works, Mumbai Metro Rail Corporation opted to explore the use of sprayed waterproofing membranes and permanent fibre reinforced sprayed concrete linings (PSCL) as well as development of a 'drained regulating layer' concept which allowed the application of sprayed waterproofing membranes in wet conditions; this is a first for any metro project in India.

The successful implementation of water management and PSCL linings on the SRCC is envisaged to be a revolutionary step forward for the tunnelling industry in India.

Thomas Macgowan will present on the site experience of delivering the temporary water management, fireproofing design and gaining design approval for permanent SCL. Robin Swift will present the procurement of sprayed membrane and SCL site trails, managing material approvals and overcoming the logistical challenges faced. The presentation will also focus on the personal experience and lessons learned from working in India.

Note: This in-person lecture will also be streamed live at <https://youtu.be/tsvmJ6rwyv8>



IAEG NEWS

Photo of the Egnatia Odos Tunnels and Bridge, Epirus Region, Northern Greece



Building of this incredible road and bridge in the Pindus Mountain Range was a very complex engineering geology and geotechnical engineering project that involved a TBM (tunnel boring machine) in the local geology of limestone, clays, gneiss, molassic rocks, flysch, phyllites, ophiolites, schist and many fault zones.

Submitted by: Professor Nicholas Vlachopoulos, Dept. of Civil Engineering, Queens University, Kingston, Ontario, Canada. Dr. Nicholas Vlachopoulos is also Director of the Green Team of the Royal Military College of Canada.

ΠΡΟΣΕΧΕΙΣ ΓΕΩΤΕΧΝΙΚΕΣ ΕΚΔΗΛΩΣΕΙΣ

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

ICONHIC2022: THE STEP FORWARD - 3rd International Conference on Natural Hazards & Infrastructure, 5 – 7 July 2022, Athens, GREECE, <https://iconhic.com/2021>

RocDyn-4 4th International Conference on Rock Dynamics an ISRM Specialized Conference, 17-19 August 2022. Xuzhou, China, <http://rocdyn.org>

ISFOG 2020 4th International Symposium on Frontiers in Offshore Geotechnics, 28 – 31 August 2022, Austin, United States, www.isfog2020.org

16th International Conference of the International Association for Computer Methods and Advances in Geomechanics – IACMAG 30-08-2022 – 02-09-2022, Torino, Italy, www.iacmag2022.org

WTC 2022 World Tunnel Congress 2022 - Underground solutions for a world in change, 2-8 September 2022, Copenhagen, Denmark, www.wtc2021.dk

11th International Symposium on Field Monitoring in Geomechanics, September 4 - September 7, 2022, London, UK, <https://isfmg2022.uk>

7th European Geosynthetics Conference, 4 to 7 September, 2022, Warsaw, Poland, <https://eurogeo7.org>

3rd European Conference on Earthquake Engineering & Seismology, September 4 – September 9, 2022, Bucharest, Romania, <https://3ecee.ro>

Eurock 2022 Rock and Fracture Mechanics in Rock Engineering and Mining, 12÷15 September 2022, Helsinki, Finland, www.ril.fi/en/events/eurock-2022.html

IAEG XIV Congress 2022, Chengdu, China September 14-20, 2022, <https://iaeg2022.org>

28th European Young Geotechnical Engineers Conference and Geogames, 15 – 17 – 19 September 2022, Moscow, Russia, <https://www.evgec28.com/?>

International Workshop on Advances in Laboratory Testing of Liquefiable Soils, 17 September 2022, Kyrenia, North Cyprus, <https://nce2022.ktimo.org>

10th International Conference on Physical Modelling in Geotechnics (ICPMG 2022), September 19 to 23, 2022, KAIST, Daejeon, Korea, <https://icpmg2022.org>

11th International Conference on Stress Wave Theory and Design and Testing Methods for Deep Foundations, 20 – 23 September 2022, De Doelen, Rotterdam, The Netherlands, <https://www.kivi.nl/afdelingen/geotechniek/stress-wave-conference-2022>

10th Nordic Grouting Symposium, 4 – 6 October, 2022, Stockholm, Sweden, <https://www.ngs2022.se/>

Smart Geotechnics 2022, 6 October 2022, London UK, <https://smartgeotechnics.geplus.co.uk/smartgeotechnics/en/page/home>

IX Latin American Rock Mechanics Symposium - Challenges in rock mechanics: towards a sustainable development of infrastructure, an ISRM International Symposium, 16-19 October 2022, Asuncion, Paraguay, <http://larms2022.com>

5ο Πανελλήνιο Συνέδριο Αντισεισμικής Μηχανικής και Τεχνικής Σεισμολογίας, 20-22 Οκτωβρίου 2022, Αθήνα, <https://5psamts.eltam.org>

2022 GEOASIA7 - 7th Asian Regional Conference on International Geosynthetics Society, October 31 – November 4, 2022, Taipei, Taiwan, www.geoasia7.org

CouFrac 2022 - 3rd International Conference on Coupled Processes in Fractured Geological Media: Observation, Modeling, and Application, November 14-16, 2022, Berkeley, California, USA, <https://coufrac2022.org>

Piling & Ground Improvement Conference 2022, November 16-18, 2022, Sydney, Australia, <https://events.american-tradeshow.com/pilingconference2022>

AUSROCK Conference 2022, 6th Australasian Ground Control in Mining Conference – an ISRM Regional Symposium, 29 November – 1 December 2022, Melbourne, Australia, www.ausimm.com/conferences-and-events/ausrock/

16th ICGE 2022 – 16th International Conference on Geotechnical Engineering, Lahore, Pakistan, 8-9 December, 2022, <https://16icge.uet.edu.pk/>

4th African Regional Conference on Geosynthetics – Geosynthetics in Sustainable Infrastructures and Mega Projects, 20-23 February 2023, Cairo, Egypt, www.geoafrica2023.org

ASIA 2023, 14 – 16 March 2023, Kuala Lumpur, Malaysia, www.hydropower-dams.com/asia-2023



3rd International Conference TMM_CH
"Transdisciplinary Multispectral Modelling and Cooperation for the Preservation of Cultural Heritage: Recapturing the World in Conflict through Culture, promoting mutual understanding and Peace"
20-23 March 2023, Athens, Greece
www.tmm-ch.com

ABOUT THE CONFERENCE

Innovative scientific methodologies and challenging projects marking future trends in the protection of cultural heritage,

have initiated a universal conversation within a holistic approach, merging competence from the scientific fields of architecture, civil engineering, surveying engineering, materials science and engineering, information technology and archaeology, as well as heritage professionals on restoration and conservation, stakeholders, industry representatives and policy makers. The combined utilization of digital documentation technologies with innovative analytical and non-destructive techniques, numerical, computational and 3D techniques, archaeometric and archaeogene methods, supports the creation of a transdisciplinary multispectral modeling towards the sustainable preservation of cultural heritage. Innovation is enhancing and revealing a critical dimension of the preservation of cultural heritage along with social participation and communication, and supporting peace through culture.

The National Technical University of Athens interdisciplinary team "Protection of monuments" [Prof. A. Moropoulou, Prof. M. Korres, Prof. A. Georgopoulos, Prof. C. Spyarakos, Ass. Prof. C. Mouzakis], scientific responsible for the Holy Aedicule's rehabilitation of the Holy Sepulchre in Jerusalem, and the Technical Chamber of Greece, in collaboration with international and Greek Organisations and Universities, organize the 3rd TMM_CH International Conference on "Transdisciplinary Multispectral Modelling and Cooperation for the Preservation of Cultural Heritage: Recapturing the World in Conflict through Culture, promoting mutual understanding and Peace", on 20-23 March 2023 in Athens, Greece, discussing modern trends in the original agora of our technological and democratic roots.

The Conference is organized by the National Technical University of Athens in cooperation with the Technical Chamber of Greece, under the patronage of H.E. the President of the Hellenic Republic, Ms Katerina Sakellaropoulou, with benedictions bestowed by His All Holiness, Ecumenical Patriarch, Bartholomew I of Constantinople, and His Beatitude Archbishop Hieronymus II of Athens and All Greece.

Distinguished scientists and representatives of the National Geographic Society, the Cultural Heritage Finance Alliance, the International Council of Monuments and Sites ICOMOS, the Organization of World Heritage Cities OWHC, the European Society for Engineering Education SEFI, the European Construction Technology Platform ECTP, the International Federation of Surveyors FIG, the International Committee CIPA Heritage Documentation, the World Monuments Fund, AHEPA Hellas and other major International and European Organizations, Associations, networks Universities and Research Centers in the field of cultural heritage preservation, participate in the International Steering and Scientific Committees which had successfully organized the 1st and 2nd TMM_CH Conferences.

The conference will be held at the Eugenides Foundation. On-site attendance and oral presentation is required and will be organised according to government restrictions against Covid-19. Scientific walk and talk visits on 23 March 2023 to Acropolis Museum [in the footsteps of the Greek Peripatetic Philosophical School] and other visits planned upon demand.

At the 1st and the 2nd TMM_CH Conferences, which were held with great success in October 2018 and December 2021 respectively at the Eugenides Foundation in Athens, with the presence of 350/650 delegates from 22/33 countries from all continents, and over five thousand viewers the emblematic rehabilitation of the Holy Aedicule of the Holy Sepulchre in Jerusalem was presented as an exemplary application, in the field of monuments' protection, of interdisciplinary and multispectral collaboration, as an outcome of innovation, not only on Research, but in the implementation process as well, with emphasis on technological advancements, not only intersect-

ing all the scientific fields of engineers and natural scientists, but also initiating an ongoing dialogue with humanities, such as Archaeology, Theology, Sociology, Diplomacy and Tourism. Innovative knowledge transfer through practice and education is continuing the venture for the rehabilitation projects in the Holy Sepulchre Church, adjoining the National Technical University of Athens and La Sapienza University of Rome with Bezalel Academy of Science and Arts in Jerusalem, in cooperation with Israeli Antiquities Authority, through the Erasmus+ Strategic Alliance EDICULA "Educational Digital Innovative Cultural Heritage related Learning Alliance".

Further to the achievements of the 2nd TMM_CH Conference the latest developments in research and innovation that identify novel trends to build an interdisciplinary approach to conservation and holistic digital documentation of cultural heritage is attempted at the 3rd TMM_CH. The utilization and reuse of monuments, historic cities and sites, forms the framework of a sustainable preservation of cultural heritage, in accordance with the principles of circular economy; in terms of respect and protection of values, materials, structures, architecture and landscape; with an informed society, able to participate effectively in the policies that will design and implement the new strategies required.

Sharing knowledge, experiences, and recommendations about sustainable cultural heritage approaches and practices at a moment of great conflicts and climate change, energy, environment and socio-economic risks, the sustainable preservation of cultural heritage is addressing challenges through mutual understanding and international cooperation.

CONFERENCE TOPICS

- Emblematic works as source of innovation and transdisciplinarity
- Resilience to Climate Change, Natural Hazards and Pandemic Risks - Biosafety
- Novel Educational Approach for the Preservation of Cultural Heritage
- Preserving Compatibility, the Materiality and Integrity of Structures and Architectural Authenticity
- Advanced Non-Destructive and Structural Techniques for Diagnosis, Redesign and Health Monitoring
- Earthquake and structural rehabilitation
- Archaeology - Archaeometry - Archaeogene
- Bridging Heritage Stakeholders, Art, Science and Industry
- Transdisciplinary dialogue for World Heritage at risk and conflict
- Digital Heritage: a holistic approach
- Green and blue deal for local and regional Sustainable Development
- Historic cities and centers: New Reuse and preservation strategies applying Circular Economy
- Cultural heritage preservation addressing energy challenges
- Recapturing the World in conflict through Culture, promoting mutual understanding and Peace



88th ICOLD Annual Meeting & Symposium on Sustainable Development of Dams and River Basins, April 2023, New Delhi, India, <https://www.icold2020.org>

UNSAT 2023 - 8th International Conference on Unsaturated Soils, 2-5 May 2023, Milos island, Greece, www.unsat2023.org

World Tunnel Congress 2023 Expanding Underground Knowledge & Passion to Make a Positive Impact on the World, 12 - 18 May 2023, Athens, Greece, <https://wtc2023.gr>

NROCK2022 - The IV Nordic Symposium on Rock Mechanics and Rock Engineering, 24 - 25 May 2023, Reykjavic, Iceland, www.nrock2023.com

3rd JTC1 Workshop on "Impact of global changes on landslide risk", 7 - 10 June 2023, Oslo, Norway, <https://jtc1-2023.com>

9th International Congress on Environmental Geotechnics Highlighting the role of Environmental Geotechnics in Addressing Global Grand Challenges, 25-28 June 2023, Chania, Crete island, Greece, www.iceg2022.org

17ARC 17th Asian Regional Geotechnical Engineering Conference, 14-18 August 2023, Nur-Sultan, Kazakhstan, <https://17arc.org>

IS-PORTO 2023 8th International Symposium on Deformation Characteristics of Geomaterials, 3rd - 6th September 2023, Porto, Portugal, www.fe.up.pt/is-porto2023

Innovative Geotechnologies for Energy Transition, 12-14 September 2023, London, UK, www.osig2023.com

SAHC 2023 13th International Conference on Structural Analysis of Historical Constructions "Heritage conservation across boundaries", 12-15 September 2023, Kyoto, Japan, <https://sahc2023.org/>

XII ICG - 12th International Conference on Geosynthetics, September 17 - 21, 2023, Rome, Italy, www.12icg-roma.org

2023 15th ISRM Congress, International Congress in Rock Mechanics Challenges in Rock Mechanics and Rock Engineering, 9-14 October 2023, Salzburg, Austria, <https://www.isrm2023.info/en/>

6th World Landslide Forum "Landslides Science for sustainable development", 14 to 17 November 2023, Florence, Italy, <https://wlf6.org>



World Tunnel Congress 2024 Shenzhen, China

China is the official host of the ITA-AITES World Tunnel Congress 2024 and 50th General Assembly.

The General Assembly which took place on June 30th by video-conference, has confirmed the candidacy of Shenzhen to organise the WTC 2024.



XVIII European Conference on Soil Mechanics and Geotechnical Engineering 25-30 August 2024, Lisbon, Portugal

Organiser: SPG

Contact person: SPG

Address: Av. BRASIL, 101

Email: spg@lnec.pt

Website: <http://www.spgeotecnia.pt>

What is ground penetration radar (GPR) and how does it work?

John Rodgman, managing director at the geotechnical drilling firm, Borehole Solutions, answers some basic questions about ground penetration radar and its applications

Despite being a non-intrusive and important aspect of many different site investigations, ground penetration radar testing is often overlooked in the geotechnical world. For the most part, this is due to the fact that GPR gets the job done efficiently, quietly and without leaving a trace. It's a method usually used to identify buried services prior to a careful excavation, but can also be used to detect sinkholes and even features of karst geology. In fact, GPR isn't limited to geotechnical settings at all. It can be used in archaeological and forensic settings too.

What is Ground Penetration Radar?

The word 'radar' is likely to conjure up thoughts of modern, or even futuristic, technology, which is why many may be surprised to discover that this technique is almost 100 years old. In fact, the first radar technology dates back to the late nineteenth century.

It was in 1926 that Dr Hülsebeck patented his pulse radar system. Following this technical milestone, radar was utilised for the very first time in a geotechnical setting. Pulses of energy are sent into the site under investigation - but how... and why?

How Does GPR Work?

High-frequency radio waves emitted by the ground penetration radar transmitter are sent directly into the ground. Upon hitting buried material - concrete, for example - the pulse is either reflected or scattered back up to the surface. The GPR receiver records the particular characteristics of the returned pulse which, in turn, allows for a comprehensive image of the subsurface to be developed.

The non-intrusiveness of the technique is, undeniably, its main advantage, as many of the features GPR is used to locate must be done so in the least intrusive way possible. Utilities will frequently be searched for with this technique, for example - such as gas works or fibre optic cables - beneath major arterial motorways. Any work that needs to be carried out in this type of setting will, of course, have a serious impact on the surrounding area due to road closures. Downtime is significantly mitigated, however, through the application of such a non-intrusive technique. On top of this benefit, GPR is considerably cheap in its operation too.

What Can GPR Identify?

To put it simply, GPR will detect pretty much any buried materials (or lack thereof). It can do this so accurately thanks to its method of recording the slightest changes in the subsurface environment. This means that it can be used to detect voids, as well as buried materials, including former coal workings and sinkholes.

How Accurate Is GPR?

Overall, ground penetration radar is an immensely accurate method of mapping and surveying. There are different factors that can result in varying accuracy, however, such as moisture content and material composition.

As GPR works on the basis that different subterranean features have different densities, and therefore send back the radar signal at different response speeds, anything that disrupts this process can be a potential problem. This means that dense near-surface material will reduce the depth the radar can penetrate. GPR can penetrate concrete, for example, but if the concrete is full of re-bar, the signal won't penetrate as deeply.

Despite this, the century-old technique of ground penetration radar can largely be trusted to deliver reliable results.

(John Rodgman (Managing Director at [Borehole Solutions](https://www.borehole-solutions.co.uk)) / THE ENGINEER, 30 Jun 2022, <https://www.theengineer.co.uk/content/opinion/blog-what-is-ground-penetration-radar-gpr-and-how-does-it-work>)

ΕΝΔΙΑΦΕΡΟΝΤΑ - ΠΕΡΙΒΑΛΛΟΝ

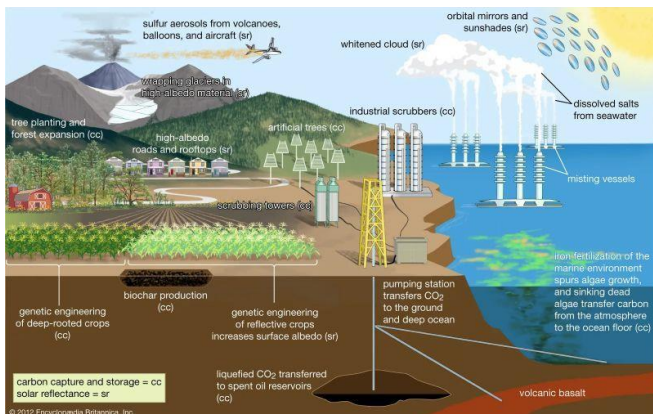
Carbon Capture and Storage (CCS) and its Impacts on Climate Change and Global Warming-Geoengineering Methods

Carbon capture and storage (CCS) technologies will play a major role in this energy transition by decarbonizing existing and new fossil fuel power plants and the production of low-carbon fossil-fuel-based blue hydrogen. Blue hydrogen can be used for hydrogen fuel cell mobility in the transport sector and heat and feedstock in the industry sector.

CO₂ can be captured using different methods. The main ones are: post-combustion, pre-combustion and oxyfuel. Post-combustion technology removes CO₂ from the flue gases that result from burning fossil fuels.

Once the CO₂ has been captured, it is compressed into liquid state and transported by pipeline, ship or road tanker. CO₂ can then be pumped underground, usually at depths of 1km or more, to be stored into depleted oil and gas reservoirs, coalbeds or deep saline aquifers, where the geology is suitable.

At the moment, CCS is the only technology that can help reduce emissions from large industrial installations. It could be an essential technology for tackling global climate change.



Get Full Information Here@- <https://lnkd.in/dqkyvVDN>

ΗΛΕΚΤΡΟΝΙΚΑ ΠΕΡΙΟΔΙΚΑ



www.issmge.org/publications/issmge-bulletin/vol-16-issue-3-june-2022

Κυκλοφόρησε το Τεύχος 3 / Τόμος 16 Ιουνίου 2022 του ISSMGE Bulletin με τα ακόλουθα περιεχόμενα:

- **Message from Board-level committee**
- **TC corner**
 - TC304 meeting
 - TC305 meeting
- **ISSMGE Foundation reports**
- **Event Diary**
- **Corporate Associates**
- **Foundation Donors**



ISRM Newsletter No. 58 - June 2022

Κυκλοφόρησε το Τεύχος Αρ. 58 Ιουνίου 2022 της ISRM με τα ακόλουθα περιεχόμενα:

- [Invitation to the ISRM 2022 International Symposium – LARMS IX, Asunción, Paraguay, 16-19 October 2022](#)
- [38th ISRM online lecture by Prof. Yingxin Zhou](#)
- [15th International ISRM Congress, Salzburg, Austria – deadline for submission of abstracts is now 31 October 22](#)
- [Eurock2022, Helsinki-Espoo, Finland, 12-15 September](#)
- [12th Asian Rock Mechanics Symposium - ARMS12, Hanoi, Vietnam, 22-26 November](#)
- [AusRock 2022, Melbourne, 29 November-1 December - an update](#)
- [New course on Rockburst in Deep Tunnels](#)
- [Second European Rock Mechanics Debate](#)
- [ISRM Young Members' Seminar Series completed 6 months](#)
- [RocDyn-4, Xuzhou, China, 17-19 August 2022 - an update](#)

- [9th Brazilian Rock Mechanics Symposium, 23-26 August 2022, Campinas, Brazil](#)
- [CouFrac 2022, 14-16 November, Berkeley, California, USA](#)
- [ISRM Rocha Medal 2024 - nominations to be received by 31 December 2022](#)
- [ISRM Sponsored Conferences](#)



Κυκλοφόρησε το IGS Newsletter της International Geosynthetic Society με τα ακόλουθα περιεχόμενα:

IGS NEWSLETTER – June 2022

Helping the world understand the appropriate value and use of geosynthetics

<http://www.geosyntheticssociety.org/newsletters>

- 8 Days Left to Vote! IGS Elections Close on 18 June! [CAN-DIDATE BIOS](#), [FAQs](#) READ MORE: [Efficiency Boost For IGS Council Election Process](#)
- IGS Poland Primed For EuroGeo7 [READ MORE](#)
- IGS Response to European Commission Microplastics Consultation [READ MORE](#), [DOWNLOAD PDF](#)
- Beat the Deadline for GeoAfrica Abstracts [READ MORE](#)
- IGS Young Members Photo Contest – Open Now! [READ MORE](#)
- 10 Questions With... Jabulile Msiza [READ MORE](#)
- Spotlight On The IGS Technical Committees: Origins [READ MORE](#)
- New IGS Landfill Leaflet Available! [READ MORE \[PDF\]](#)
- My Engineer Life With... Yunfei Zhao [READ MORE](#)
- IGS Awards: Call for Nominations 2018 – 2021 [READ MORE](#)
- Upcoming Webinars
 - Modeling tensile strains and the impacts of the seams, patches, and scratches on geomembrane integrity, June 15, repeated on June 21, Presented by Prof. Edward Kavazanjian [REGISTRATION INFORMATION](#)



www.icevirtuallibrary.com/toc/jgein/29/3

Κυκλοφόρησε το Τεύχος 3 του Τόμου 29 (Ιουνίου 2022) του Geosynthetics International της International Geosynthetics Society με τα ακόλουθα περιεχόμενα:

[Permittivity and filtration properties of grout socks for rock bolt installations](#), C. Lam, S.A. Jefferis, 29(3), pp. 174–185

[Experiments and dimensional analysis of waste tire-based permeable pavements](#), A. Soltani, R. Raeesi, M. M. Disfani, 29(3), pp. 186–204

[Bearing capacity improvement using soil-filled post-consumer PET bottles](#), S. N. Moghaddas Tafreshi, A. Rafieezadeh Malekshah, M. Rahimi, A.R. Dawson, 29(3), pp. 205–216

[Evaluation of required stiffness and strength of cellular geosynthetics](#), F. Song, W. Chen, Y. Nie, L. Ma, 29(3), pp. 217–228

[Undrained response of geocell-confined pond ash samples under static and cyclic loading](#), S. Chowdhury, N. R. Patra, 29(3), pp. 229–240

[Interface creep behavior of tensioned GFRP tendons embedded in cemented soils](#), C. Chen, S. Zhu, G. Zhang, A. M. Morsy, J. G. Zornberg, J. Huang, 29(3), pp. 241–253

[Laboratory evaluation of different geosynthetics for water drainage](#), Y. Guo, C. Lin, W. Leng, X. Zhang, 29(3), pp. 254–269

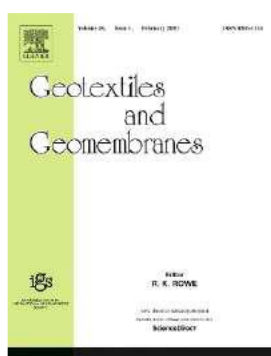
[Consolidation of unsaturated soil by vertical drain considering smear and well resistance](#), Z. Chen, P. Ni, X. Zhu, D. Chen, G. Mei, 29(3), pp. 270–281

[Air and hydraulic flow characteristics of polymer amended bentonite based unsaturated GCLs](#), S. Rajesh, A. Jain, 29(3), pp. 282–298

[Dewatering of dredged slurry by horizontal drain assisted with vacuum and flocculation](#), H. Pu, D. Khotaja, Y. Zhou, Y. Pan, 29(3), pp. 299–311

[Geosynthetic encased column-supported embankment: behavior with and without basal geogrid](#), X. Zhang, S. Rajesh, J.-F. Chen, J.-Q. Wang, 29(3), pp. 312–325

[Effect of temperature on the mechanical properties of two polymeric geogrid materials](#), R. L. E. Desbrousses, M. A. Meguid, S. Bhat, 29(3), pp. 326–336



www.sciencedirect.com/journal/geotextiles-and-geomembranes/vol/50/issue/3

Κυκλοφόρησε το Τεύχος 3 του Τόμου 50 (Ιουνίου 2022) του Geotextiles and Geomembranes της International Geosynthetics Society με τα ακόλουθα περιεχόμενα:

[Editorial Board](#), Page ii

1. Regular Articles

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