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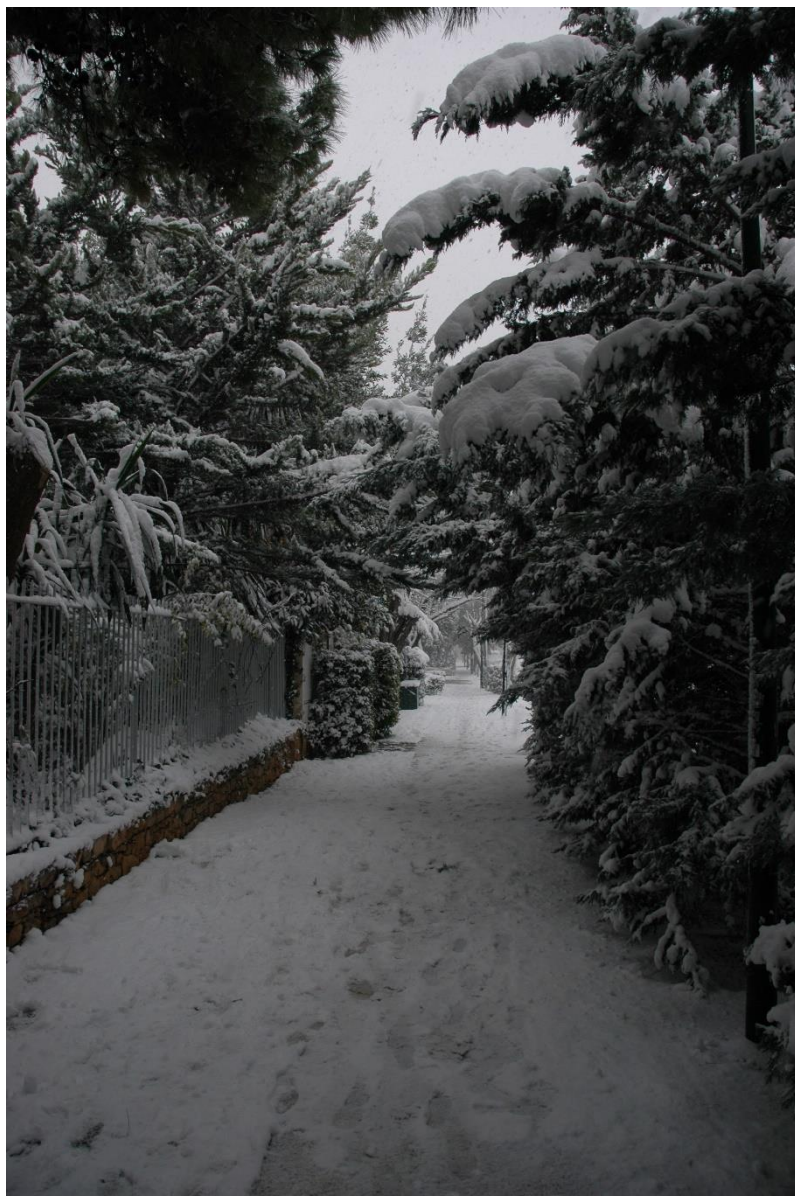
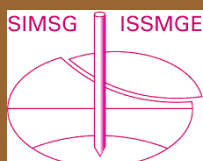


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ΕΔΑΦΟΜΗΧΑΝΙΚΗΣ
& ΓΕΩΤΕΧΝΙΚΗΣ
ΜΗΧΑΝΙΚΗΣ

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Γεφύρι Νούτσο (Κόκκορη), Ζαγόρι

Widespread liquefaction hampers reconstruction after M7.6 earthquake in Ishikawa, Japan



In the aftermath of the January 1 earthquake, the city of Wajima in Ishikawa Prefecture faces significant challenges due to liquefaction, severely impacting infrastructure and complicating relief efforts. Continuous aftershocks further hinder the restoration process, with houses, roads, and manholes notably affected. Governor Hiroshi Hase has requested a comprehensive investigation from the central government to address the escalating situation, emphasizing the need for seismic reinforcement of underground infrastructure.

In the wake of the [January 1, 2024 M7.6 earthquake in Japan](#), the city of Wajima, located in Ishikawa Prefecture, has been severely impacted by liquefaction, a phenomenon that reduces the strength of soil due to seismic activity, particularly affecting coastal areas.

This has significantly hampered relief and restoration efforts in the region, with continuous aftershocks further complicating the situation. Liquefaction has led to visible and dramatic changes in the landscape, including protruding manholes, tilted or partially buried houses, and deformed roads.

Fumihiko Imamura, a professor at Tohoku University's International Research Institute of Disaster Science, explains that liquefaction occurs when moisture in the soil breaks loose from grains of soil due to the shaking caused by an earthquake. This process can cause water to rise up, leading to the surfacing of sand on land and the elevation of manholes.



<https://www.youtube.com/watch?v=XMDhccmg7nA&t=1s>

The phenomenon was not limited to Wajima but was also severe in cities like Suzu in Ishikawa, and extended across a wide area of the Sea of Japan coast, affecting regions from Uchinada near Kanazawa to Niigata and Joetsu in Niigata Pre-

ecture. Notably, during the Great East Japan Earthquake in March 2011, areas far from the epicenter, such as reclaimed land in Urayasu, Chiba Prefecture, also experienced liquefaction, indicating the widespread potential for this phenomenon.

Ishikawa's Governor, Hiroshi Hase, called for a comprehensive investigation into the liquefaction phenomenon, especially in Uchinada, recognizing that the town requires support for such a large-scale study. The restoration of manhole covers and underground sewage pipes, which are critical for the area's infrastructure, necessitates specialized repairs.

One of the overarching challenges highlighted by the earthquake's aftermath is the lack of seismic reinforcement across many of Japan's pipelines. As of the end of March 2022, out of 86 594 km of major pipelines requiring seismic reinforcement, only about 55% had been reinforced.

Imamura points out that Japan's disaster response tends to be reactive, based on experiences from previous events. However, the unique challenges posed by liquefaction, which can overlap with other disaster types like earthquakes and tsunamis, demand a more proactive and prepared approach.

The reconstruction in the Tohoku region post-3/11 was accelerated by the tsunami's cleansing effect, but the recovery from liquefaction presents a more complex challenge, requiring long-term efforts to solidify the ground and restore the affected areas fully.

References:

¹ Quake-induced liquefaction hampers Noto reconstruction – The Japan Times – February 16, 2024

² Liquefaction triggered by Noto Peninsula Earthquake causes extensive damage – NHK – January 23, 2024

Featured image credit: Nippon (stillshot)

(THE WATCHERS, Friday, February 16, 2024, <https://watchers.news/2024/02/16/widespread-liquefaction-hampers-reconstruction-after-m7-6-earthquake-in-ishikawa-japan/>)

Landslide Information Map

This map is a layout of the [KGS Geologic Map Information Service](#) which activates layers that display the locations of known landslides and areas susceptible to landslides in a geologic and geomorphic context. The purpose of the map is to provide an overall view of landslide hazards across the state. Locations come from Kentucky Geological Survey research, published maps, state and local government agencies, the public, and media reports, thus making attributes and spatial accuracy highly variable. There are five landslide data layers represented as either points, lines, or polygons. This map can be used to identify preexisting landslides and serve as a basis for landslide hazard and risk assessments. It is not intended for site specific investigations. The absence of landslides in an area does not infer that a landslide does not exist or that the ground is stable. A professional geologist or geotechnical engineer should be consulted for planned construction at identified landslide locations or identified landslide areas. A professional geologist or geotechnical engineer should also be consulted for slope stabilization and other mitigation efforts related to existing slides.

The default Base Layer shown is a LiDAR-derived multi-directional hillshade (1.5 m). The LiDAR layer (Layers menu - under the "KYFromAbove Layers" heading) can be adjusted for varying amounts of transparency and is particularly useful to view with the geology layers and/or the aerial photography Base Layer.

Open Landslide Information Map

<https://kgs.uky.edu/kygeode/geomap/?layoutid=25>

Landslide Map Layer Descriptions

Five datasets are contained within the "KGS Landslide Inventory" map layer. Their descriptions are as follows:

KGS landslide inventory data

This map layer contains known landslide locations (points) across Kentucky compiled in a landslide inventory database. The locations come from Kentucky Geological Survey research, state and local government agencies, and the public. The points represent larger landslide areas that have not been mapped in detail and may fall within different parts of the slide area (crown, head scarp, middle, or toe). The landslides are active or have historically been active. Landslide locations are collected at different times and contain varying amounts of attributes. Click on a landslide point in the map to view the attributes. Many attribute values are "Null" or "n/a" and data is only present if the slide was visited or could be collected another way.

The SourceDesc field describes the source of the landslide location. KGS=Kentucky Geological Survey, KY EM = Kentucky Emergency Management, KYTC = Kentucky Transportation Cabinet, DNR-DMRE = Division of Natural Resources-Mine Reclamation & Enforcement, NRCS = Natural Resource Conservation Service, NKAPC = Northern Kentucky Area Planning Commission, NKU = Northern Kentucky University. The inventory does not capture work by private industry or other agencies that document landslides but do not make them available.

1:24,000 geologic map landslides

These landslide locations (polygons) were mapped on 7.5-minute, 1:24,000-scale geologic quadrangles published jointly by the Kentucky Geological Survey and US Geological Survey from 1960 to 1978. Attributes include original map symbol, formation name, county, quadrangle, and Area Development District. Landslides were not mapped on all quad-

ranges in Kentucky. Search source data on the [KGS publications search page](#).

Derived from LiDAR

These landslides (polygons) were interpreted and mapped using LiDAR-derived digital elevation models (DEM) that range from 1 to 1.5-meter horizontal resolution and have a quality level of 1 to 3. The quality level refers to nominal pulse spacing (NPS), which is an aggregate of all strikes and is approximately < 0.35 to < 1.4 m). Ground strike spacing, which is what is used to generate bare earth hillshade models, will typically be greater than the aggregate NPS. Primarily using LiDAR-derived hillshades, landslide extents were identified and digitized. Extents of landslides were digitized to include features such as headscarps, flanks, toe slopes, and hummocky topography observed in the hillshade. Secondary support maps including slope, roughness, curvature, plan curvature, and contours, as well as aerial photography, were used to help identify landslide features and constrain confidence in interpreting landslide extents. Locations were field verified, where possible. Attributes vary depending on when landslides were mapped. Some of the mapped landslides have a specific mapper-based confidence rating system. For those values see these resources:

- [Using landslide-inventory mapping for a combined bagged-trees and logistic regression approach to determining landslide susceptibility in eastern, Kentucky](#)
- [Using LiDAR to Map Landslides in Kenton and Campbell Counties, Kentucky \(PDF\)](#)
- [Landslide Inventory and Susceptibility Models, Prestonsburg 7.5-min Quadrangle, Kentucky, USA](#)

Derived from Aerial Photos

This layer (polygons) represents mapped landslides including earthflows, debris slides, and slumps. The data come from a series of published Landslide and Related Features Maps and Landslide Potential Maps that cover most of southeastern and south-central Kentucky. Landslides were interpreted from aerial photographs and historical records. The features digitized (polygons) depict generalized slope conditions as they existed at the time of field checking (1977-1981). Slope stability may decrease by excavation, loading, and changes in drainage conditions. The data are from preliminary type maps and are suited for general planning purposes only. Search source data on the [KGS publications search page](#).

Areas susceptible to debris flows

This layer (lines) represents debris flow deposits or areas susceptible to debris flows. Primarily these areas are shallow, narrow ravines containing variable accumulations of hillslope soil called colluvium. Areas of thick colluvium are susceptible to rapid movement during intense rainfall. The data come from a series of published Landslide and Related Features Maps and Landslide Potential Maps that cover most of southeastern and south-central Kentucky. The features were interpreted from aerial photographs and historical records. The debris flows digitized (lines) depict generalized slope conditions as they existed at the time of field checking (1977-1981). The data are from preliminary type maps and are suited for general planning purposes only. Search source data on the [KGS publications search page](#).

Confidence Ranking

A semi-quantitative confidence ranking is assigned to each landslide feature for all layers shown on the map. The rankings are based on Landslides Across the USA: Occurrence,

Susceptibility, and Data Limitations ([Mirus and others, 2020](#)). Confidence rankings range from "1" (low confidence) through "8" (high confidence) and reflect the relative value of different data.

8 – High confidence that the nature and/or spatial extent of the landslide is well characterized

This highest confidence level is typically based on detailed field observations and/or expert analysis of high-resolution topographic data or aerial imagery to characterize the landslide.

5 – Confident that a consequential landslide took place at the specified location

This level of characterization still involves high confidence that a landslide took place at the specified location as evidenced by fatalities and/or damage to infrastructure, but detailed observations of landslide features are not described in the geodatabase.

3 - Landslide likely at or near the specified location

This middle confidence level reflects a known landslide occurred with lower certainty on the exact position or nature of the slope failure. These typically include verified landslides on lower resolution topographic maps or aerial imagery and landslide data that predates digital topography and precise global positioning systems.

2 - Probable landslide in the area

Although the exact location and extent of the landslide is not documented, it is probable that a landslide did occur within close proximity to the specified location. This includes geologic mapping of landslide deposits that may correspond to multiple landslides as well as individual landslides mapped with low resolution topographic data.

1 - Possible landslide occurred in the area

The lowest confidence level reflects the uncertain nature of some media reports and the lack of expert classification and characterization from old maps.

Landslide Susceptibility

A landslide susceptibility map classifies or ranks slope stability based on relationships between variables that contribute to instability. This method differs from other types of landslide hazard maps, which may include elements of time or estimated landslide extent. [Learn more about this layer.](#)

Landslide Basics

Landslides are the downslope movement of rock, soil, or both under the influence of gravity. A combination of steep slopes, excessive pore-water pressure, weak rocks and soil, and slope modification commonly contributes to landslide occurrence. Landslide types vary by the rate of movement, style of movement, and type of hillslope material involved (Figure 1).

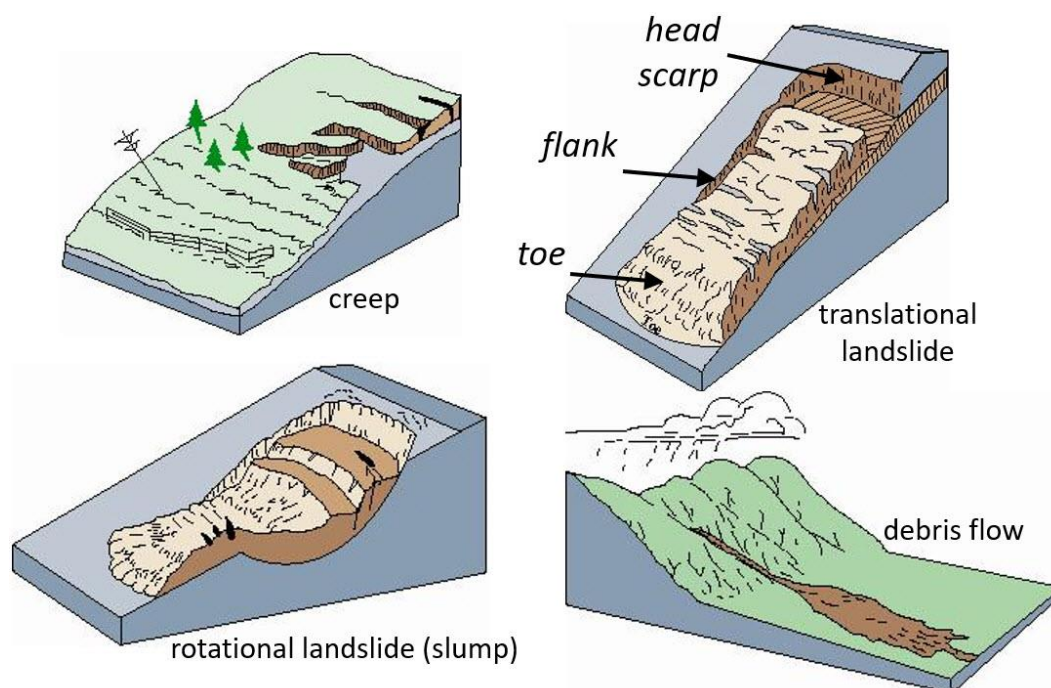


Figure 1. Selected landslide types commonly occurring in Kentucky. Modified from [The Landslide Handbook, U.S. Geological Survey Circular 1325 \(2008\)](#).

Landslides are caused by stresses on a slope that exceed the strength of the hillslope soil. Stresses can include increased pore-water pressure (from rainfall), gravity, or some type of slope modification (loading or excavating). Intense or long-duration rainfall can trigger slides, rock falls, debris flows, or other landslide types. The danger is greatest during the late winter and early spring months, before large trees leaf out and remove water by evapotranspiration as it infiltrates into hillside soils. These stresses act over time and space at different scales and magnitudes, often making hazard and risk assessment challenging. Diverse terminology and definitions

among geologists, engineers, and the public are a reflection of the complex landslide processes. Some of the most common terms are landslide, mudslide, and rockslide. Other terms such as mass wasting, slope movement, and slope failure are also commonly used to discuss landslide phenomena. Regardless of which term is used, all landslides share physical and mechanical (in rock and soil) processes that explain their occurrence.

Related Links:

- KGS Landslide Research Page -
<https://www.uky.edu/KGS/geologichazards/land-slide.htm>
- Report a Landslide -
<https://kgs.uky.edu/kgsweb/kgsweb/landslide.asp>
- Landslide Susceptibility Map Help -
https://kgs.uky.edu/kgsmap/helpfiles/land-slidesusc_help.shtm
- KGS Landslide Map Service Metadata -
<https://kgs.uky.edu/arcgis/rest/services/Hazards/LandslideSusceptibility/MapServer>
- KGS Landslide Susceptibility Service Metadata -
<https://kgs.uky.edu/arcgis/rest/services/Hazards/LandslideInformationMap/MapServer>

Understanding fatal landslides at global scales: a summary of topographic, climatic, and anthropogenic perspectives

Seçkin Fidan, Hakan Tanyaş, Abdullah Akbaş, Luigi Lombardo, David N. Petley, Tolga Görüm

Abstract

Landslides are a common global geohazard that lead to substantial loss of life and socioeconomic damage. Landslides are becoming more common due to extreme weather events and the impacts of anthropogenic disturbance, and thus, they are threatening sustainable development in many vulnerable areas. Previous studies on fatal landslides have focused on inventory development; spatial and temporal distributions; the role of precipitation or seismic forcing; and human impacts. However, climatologic, topographic, and anthropogenic variables featuring fatal landslides at a global scale have been mostly neglected. Here, using the global fatal landslide database, we evaluate the characteristics of landslides induced by natural and anthropogenic factors with respect to topographic, climatic, and anthropogenic factors, drawing attention to their persistent spatial patterns. The majority of natural (69.3%) and anthropogenic (44.1%) landslides occur in mountainous areas in tropical and temperate regions, which are also characterized by the highest casualty rates per group, 66.7% and 43.0%, respectively. However, they significantly differ in terms of their morphometric footprint. Fatal landslides triggered by natural variables occur mostly in the highest portions of the topographic profile, where human disturbance is minimal. As for their anthropogenic counterpart, these failures cluster at much lower altitudes, where slopes are gentler, but human intervention is higher due to a higher population density. This observation points towards land cover changes being a critical factor in landscape dynamics, stressing the human pressure as a discriminant cause/effect term for natural vs. human-induced landslide fatalities.

1 Introduction

Landslides are one of the most widespread geohazards that globally cause significant loss of life and environmental damage (Petley 2012; Kirschbaum et al. 2015; Froude and Petley 2018). Impacts of landsliding are exacerbated by more frequently occurring extreme weather events and increased human occupation of vulnerable mountainous landscapes (Grima et al. 2020). Specifically, the growing demographic pressure and land use/cover changes are expected to increase the frequency and impacts of landslides in both rural (Guns and Vanacker 2014; Froude and Petley 2018; Maki Mateso et al. 2023) and urban (Gariano and Guzzetti 2016; Froude and Petley 2018; Ozturk et al. 2022) areas.

Therefore, developing a better understanding of variables controlling landslide occurrence is a critical element in landslide disaster prevention. In this context, the recording, monitoring, and analysis of landslides form essential elements in developing more robust predictive models.

Digital documentation and archiving of landslides have become increasingly common, most notably in the last two decades (e.g., Tanyaş et al. 2017; Emberson et al. 2022). Despite the expanding literature, financial losses and fatalities are rarely reported as part of landslide event inventories. And yet, a relatively large literature has been constructed that targets climatic and anthropogenic influences on fatal landslides across different spatial and temporal domains, including national (e.g., Petley et al. 2007; Lin and Wang 2018; Görüm and Fidan 2021; Garcia-Delgado et al. 2022), regional (e.g., Petley 2010; Sepúlveda and Petley 2015; Haque et al. 2016, 2019), and global (e.g., Kirschbaum et al. 2010, 2015; Petley 2012; Froude and Petley 2018; Haque et al. 2019) scale assessments.

The contextual effect of human stress on slopes under extreme weather conditions has already been noticed in a number of global studies, emphasizing hotspots in Central and Southeast Asia; Central and South America; as well as East Africa (Kirschbaum et al. 2012, 2015; Froude and Petley 2018; Haque et al. 2019). Such occurrences have also been responsible for a proportional increase in fatalities (Haque et al. 2019). A closer look at fatal landslide hotspots highlights South Asia as the most affected region, mainly driven by the summer monsoon, and East Asia, driven by landfalling tropical cyclones and a monsoonal climate. These aspects have been explored in depth by Petley (2010), which also highlights Southeast Asia (mainly the Philippines and Indonesia) as a landslide fatality hotspot, albeit without linking them to a specific climatic regime. Similar studies have also been conducted in other parts of the world. Sepúlveda and Petley (2015) examine fatalities in the Caribbean region, Central America, Colombia, and southeastern Brazil. They emphasize the role of large-scale hurricanes, with the El Nipo/La Nipa cycle as an additional disturbance, potentially leading to more fatalities. In another study focusing on the European landscape, Haque et al. (2016) argue that human activities may exert a minor effect with respect to extreme natural agents.

Similar studies have also been carried out at finer spatial scales, being tailored to specific countries such as the Democratic Republic of Congo (Depicker et al. 2021), Nepal (Petley et al. 2007), and Turkey (Görüm and Fidan 2021), where the spatial distribution of landslides has been associated with land use changes, civil wars or economic and political influences, respectively. This implies that anthropogenic influences seem to be more apparent in a finer resolution review. For instance, Garcia-Delgado et al. (2022) refer to low income, high corruption, and inequality effects as factors increasing the vulnerability against landsliding in Colombia.

This overall perspective on such a complex phenomenon has lacked a holistic examination of how macro-landforms and their morphometric characteristics, anthropogenic pressure, and climatic regimes interplay to generate landslide-related losses. The research reported here aims to start to fill this specific gap. With this idea in mind, we accessed the Global Fatal Landslide Database (GFLD) produced by Froude and Petley (2018) and initially aggregated the records at the basin scale. Then, we examined the persistent spatio-temporal occurrence of landslide fatalities against a number of morphologic and climatic features, aiming at capturing variations between landslides driven by natural or anthropogenic variables.

2 Data

In this study, we selected a total of 12 potential controlling factors in five categories: topographic (elevation, slope, elevation standard deviation, compound topographic index, and macro landforms), climatic (climate classification and precipitation), hydrographic (subbasins), economic (GDP per capita) and anthropogenic (population, human footprint, and land cover change) variables from a variety digital sources (Table 1).

...

6 Conclusions

This study provides insight into the spatially persistent pattern of fatal landslides in relation to topographic and climatic factors likely controlling landslide occurrences. Our analyses indicate that landslides triggered by natural factors (69.3%) and fatalities (66.7%), as well as landslides triggered by anthropogenic factors (44.1%) and fatalities (43.0%), occur most frequently in the mountains and tropical/temperate climatic regions.

Table 1 The list of datasets used in this research

Data category	Data type	Datasets	Resolution	Source and details
Landslide	Fatal landslide	Global Fatal Landslide Database (GFLD)	Variable (location accuracy < 10 km)	Froude and Petley (2018)
Economic	GDP Per Capita	World Bank national accounts data and OECD National Accounts data files	Country-based	World Bank (2017)
Hydrography	Sub-basins	HydroBASINS	15 arcsecond (~ 450 m)	Lehner and Grill (2013)
Topographic	Elevation	MERIT DEM	3 arcseconds (~ 90 m)	Yamazaki et al. (2017)
	Elevation standard deviation (elev-std)	Geomorpho90m	90 m	Amatulli et al. (2020)
	Slope	Geomorpho90m	90 m	Amatulli et al. (2020)
	Compound topographic index (CTI)	Geomorpho90m	90 m	Amatulli et al. (2020)
	Macro landform	Macro Landform	30' × 30' (~ 55 km)	Amatulli et al. (2020)
Climatological	Köppen-Geiger climate classification	Köppen-Geiger	1 km	Beck et al. (2018)
	Precipitation	CHELSA Bioclim	30 arcsecond (~ 1 km)	Karger et al. (2017)
Anthropogenic	Population density	LandScan Global Population Distribution Dataset	1 km	Bright et al. (2004, 2017); Bright and Coleman (2001, 2003); Rose et al. (2018, 2021)
	Human footprint (H.F.)	Human Footprint	1 km	Mu et al. (2022)
	Land cover (only forest and settlement)	Copernicus Climate Change Service (C3S), Climate Data Store (CDS)	300 m	Climate Data Store (2019)

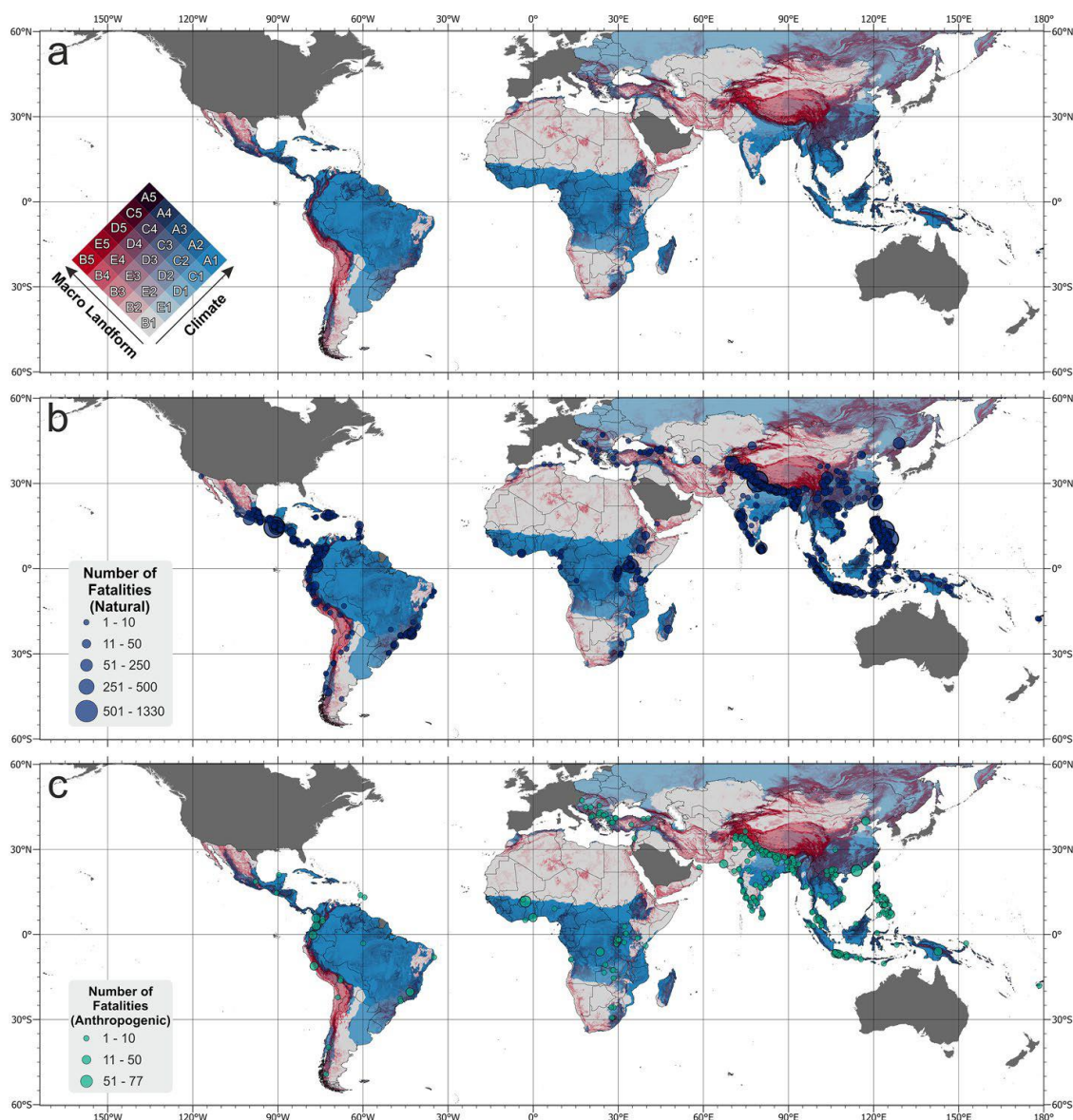


Fig. 1 Panels showing **a** the climate-landform combined map and the same map overlaid by the spatial distribution of fatal landslides and fatalities triggered by **b** natural and **c** anthropogenic factors. Climatic information is based on (A) tropical, (B) arid, (C) temperate, (D) continental, and (E) polar regions. The macro landform information is expressed into plains (1), lowlands, plateaus, and low plateaus (2), middle, high, and very high plateaus (3), low and middle mountains (4), and high and very high mountains (5). The size of the landslide point indicates the number of fatalities for each event. Grey areas indicate regions that were masked out

We also showed that LTNF tends to occur at higher elevations on steeper slopes, while LTAF concentrates at lower elevations and gentler slopes. South and Southeast Asia, Central America and South America, and the Great Rift Valley are global-scale hotspots of fatal landslides. These hotspots correspond to areas vulnerable to climate change and, thus, landscapes with an expected increase in landsliding rates. Therefore, these susceptible areas could be more vulnerable in the future when climatic extremes are coupled with human impact.

Our research also highlights the role of land cover changes and increased human pressure in the occurrence of natural-induced fatal landslides. In this context, we argue that human activities impact not only fatal landslides of anthropogenic origin but also fatal landslides of natural origin. In this respect, we emphasize the importance of understanding the complex interactions between natural and human factors in the occurrence of fatal landslides. Comprehensive and adaptive strategies are needed to reduce landslide risks in mountainous areas of tropical and temperate climatic regions, especially in the face of climate change and increasing human pressure. Finally, future work should continue to monitor and assess fatal landslides and focus on developing more reliable and comprehensive inventories.

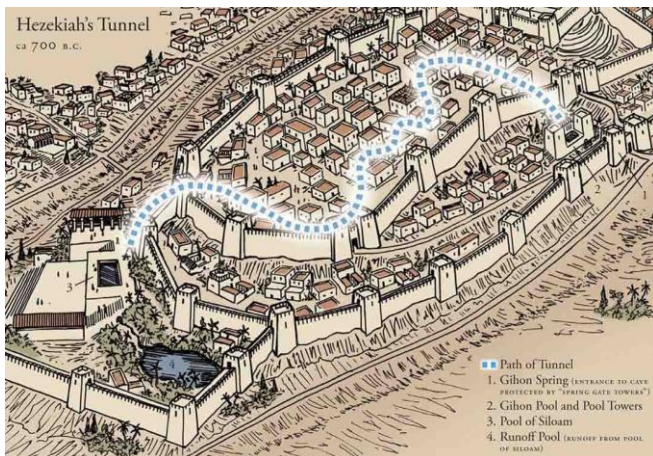
Natural Hazards

<https://doi.org/10.1007/s11069-024-06487-3>

<https://link.springer.com/article/10.1007/s11069-024-06487-3>

The Siloam Tunnel - One of The World's Oldest Known Tunnels

The Siloam Tunnel, also known as Hezekiah's Tunnel, is an ancient water tunnel located in Jerusalem. It was constructed during the reign of King Hezekiah of Judah, around 701 BC, as a strategic measure to protect the city's water supply from potential Assyrian attacks.



The tunnel served the purpose of transporting water from the Gihon Spring to the Pool of Siloam, ensuring a vital water supply for the inhabitants of Jerusalem.

The tunnel stretches approximately 1,750 feet (533 meters) and features a slight gradient to facilitate the flow of water from the spring to the pool.

The construction of the tunnel involved two teams excavating from opposite ends and meeting in the middle, as indicated by the Siloam Inscription found within the tunnel. The inscription provides insight into the construction process but is partially unreadable today, leaving some details open to interpretation.

Hezekiah's Tunnel remains a significant archaeological site within the City of David in Jerusalem. Visitors can explore this ancient marvel by walking through its narrow passages, experiencing first-hand the ingenuity of ancient engineering and water management systems. Guided tours are available to enhance visitors' understanding of the historical and engineering significance of this tunnel.

Hezekiah's Tunnel stands as a testament to ancient craftsmanship and resourcefulness, offering a unique glimpse into the technological capabilities of civilizations from centuries past.



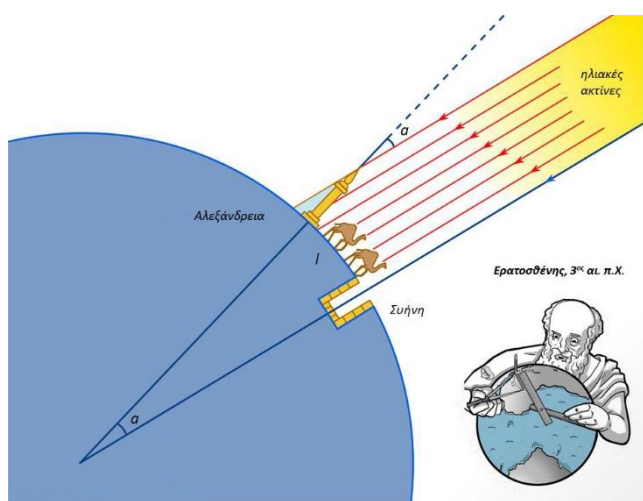
[Tunnels & Tunnelling Tunnels and Tunnelling International](#)

Το πείραμα του Ερατοσθένη: Υπολογισμός της περιφέρειας της Γης

**Δρ. Φιόρη – Αναστασία Μεταλληνού, Αστροφυσικός,
Κέντρο Επισκεπτών Θησείου, ΙΑΑΔΕΤ, ΕΑΑ**

Το «πείραμα του Ερατοσθένη» αποτελεί μια ιστορική μέθοδο για τον υπολογισμό της περιφέρειας της Γης, που πραγματοποιήθηκε από τον σπουδαίο μαθηματικό τον 3^ο αι. π.Χ. Μια μέθοδος στην οποία ο Ερατοσθένης χρησιμοποίησε ως μόνα εργαλεία μια ράβδο, «βηματιστές» της εποχής για τη μέτρηση αποστάσεων, βασικές αρχές της τριγωνομετρίας και καθαρή σκέψη.

Για εκπαιδευτικούς λόγους, η μέθοδός του εφαρμόζεται έως και σήμερα από μαθητές, ώστε -χρησιμοποιώντας βασικά στοιχεία τριγωνομετρίας- να υπολογίζουν την περιφέρεια του πλανήτη μας. Οι ισημερίες και τα ηλιοστάσια αποτελούν ιδανικές ημερομηνίες για την πραγματοποίηση του ιστορικού πειράματος του Ερατοσθένη.



Σχήμα 1: Οι υπολογισμοί του Ερατοσθένη (Πηγές εικόνων για τη σύνθεση: Encyclopaedia Britannica και <https://society6.com>)

Επιστημονικό υπόβαθρο (πριν τον Ερατοσθένη)

Οι Πυθαγόρειοι αστρονόμοι, μαθηματικοί και φιλόσοφοι, κατά τον 6^ο αι. π.Χ., δέχονταν ήδη τη σφαιρικότητα της Γης. Οι Έκφαντος, Ικέτας και Ηρακλείδης ο Ποντικός τη θέτουν να περιστρέφεται γύρω από τον άξονά της σε 24 ώρες. Αποδίδουν δε τη φαινόμενη κίνηση της ουράνιας σφαίρας από Ανατολή σε Δύση στην περιστροφή της Γης. Ο Φιλόλαος ο Πυθαγόρειος αποτελεί ίσως τον πρώτο αστρονόμο που θεώρησε τη Γη ουράνιο σώμα και μάλιστα όχι ακίνητο, αλλά περιφερόμενο γύρω από το Κεντρικό Πυρ. Μεταγενέστερα (3^{ος} αι. π.Χ.), ο Αρίσταρχος ο Σάμιος θέτει τη Γη, όπως και τους υπόλοιπους πλανήτες, να περιφέρονται γύρω από τον Ήλιο. Ο Αριστοτέλης, στο έργο του «περί Ουρανού» (4^{ος} αι. π.Χ.), τεκμηριώνει τη σφαιρικότητα της Γης και αναφέρεται στον υπολογισμό της περιφέρειάς της από προγενέστερους μαθηματικούς.

Σφαιρικότητα της Γης

Οι Έλληνες σοφοί της αρχαιότητας διαπιστώνουν τη σφαιρικότητα της Γης βασιζόμενοι σε παρατηρήσεις που σχετίζονται με:

- Το σχήμα της σκιάς που ρίχνει η Γη στη Σελήνη κατά τη διάρκεια μιας ολικής έκλειψης Σελήνης.
- Την αλλαγή της θέσης των αστερών που βλέπουμε από διαφορετικούς τόπους της Γης την ίδια χρονική στιγμή (ή και τη μεταβολή της θέσης του πολικού αστερά όσο μετακινούμαστε από νοτιότερες προς βορειότερες περιοχές).

- Την παρατήρηση ενός πλοίου, που καθώς απομακρύνεται στον ορίζοντα από οποιονδήποτε παρατηρητή, χάνεται από την όρασή μας σταδιακά, με το κατάρτι να μένει ως το τελευταίο ορατό του σημείο. Το αντίστροφο συμβαίνει καθώς το πλοίο πλησιάζει τον προορισμό του. Ποιό ήταν όμως το μέγεθός της Γης; Πόσο μεγάλος ήταν ο κόσμος στον οποίον ζούσαν;

Ο Ερατοσθένης (276 – 194 π.Χ.)

Η πρώτη ιστορικά τεκμηριωμένη μέτρηση της περιμέτρου της Γης αποδίδεται στον Ερατοσθένη τον Κυρηναίο, τον 3^ο αι. π.Χ., στην Αλεξάνδρεια της Αιγύπτου, καθώς υπολόγισε μια τιμή η οποία παρουσιάζει μικρή απόκλιση συγκρινόμενη με τις σημερινές μετρήσεις.

Ο Ερατοσθένης υπήρξε σπουδαίος αστρονόμος, μαθηματικός, γεωδαίτης και γεωγράφος. Διετέλεσε διευθυντής της ξακουστής βιβλιοθήκης της Αλεξάνδρειας. Η Αλεξάνδρεια, χτισμένη στις εκβολές του Νείλου από τον Μέγα Αλέξανδρο, αποτέλεσε σημαντικό κέντρο παιδείας και επιστήμης από τον 4^ο έως τον 2^ο αι. π.Χ. Η περίφημη βιβλιοθήκη της Αλεξάνδρειας, ως το σημαντικότερο εκδοτικό κέντρο του τότε γνωστού κόσμου, φημιζόταν για τον πλούτο των χειρογράφων της, συγκριτικά με κάθε άλλη γνωστή βιβλιοθήκη, προσελκύνοντας πλήθος σοφών και ερευνητών της εποχής.

Η μέθοδος του Ερατοσθένη

Ο Ερατοσθένης είχε παρατηρήσει, ή γνώριζε από παρατηρήσεις άλλων ερευνητών, ότι κατά το θερινό ηλιοστάσιο, ακριβώς το μεσημέρι, ο ήλιος κατοπτρίζονταν ολόκληρος στον πυθμένα ενός πηγαδιού στη Συήνη. Η Συήνη (το σημερινό Ασσουάν) αποτελεί πόλη της αρχαίας Αιγύπτου χτισμένη στη δυτική όχθη του Νείλου, νοτιότερα της Αλεξάνδρειας. Παρατήρησε επίσης, ότι την ίδια μέρα και ώρα δεν συνέβαινε το ίδιο φαινόμενο και στην Αλεξάνδρεια. Επομένως η γωνία πρόσπτωσης των ηλιακών ακτίνων διέφερε στους δύο τόπους για τη δεδομένη χρονική στιγμή.

Θερινό ηλιοστάσιο

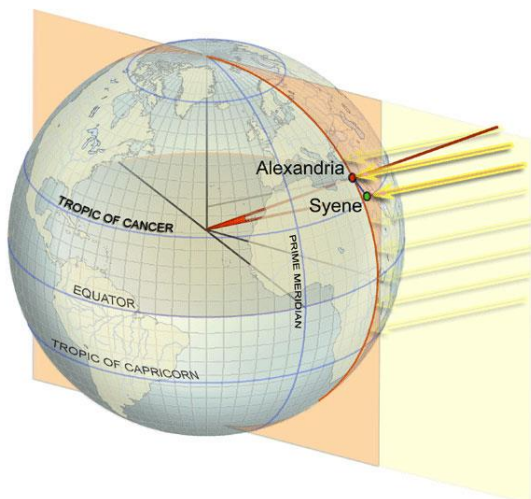
Το θερινό ηλιοστάσιο είναι η ημέρα του έτους κατά την οποία ο ήλιος βρίσκεται στο βορειότερο σημείο του στον ουρανό, καθώς τον παρατηρούμε από το βόρειο ημισφαίριο της Γης. Τότε διανύουμε τη μεγαλύτερη ημέρα του έτους (και τη μικρότερη νύχτα αντίστοιχα). Κατά το θερινό ηλιοστάσιο, από τους τόπους που βρίσκονται σε βόρειο γεωγραφικό πλάτος 23° 26', δηλαδή στον τροπικό του Καρκίνου, βλέπουμε τον ήλιο να περνά ακριβώς από το ζενίθ του το μεσημέρι. Η Συήνη βρίσκεται σχεδόν πάνω στον τροπικό του Καρκίνου, απέχοντας μόλις 20 km από αυτόν.

Υποθέσεις

Ο Ερατοσθένης ξεκίνησε με τις ακόλουθες δύο υποθέσεις: (α) Η Γη είναι σφαίρα και φωτίζεται ομοιόμορφα από τον Ήλιο. (β) Ο Ήλιος είναι τόσο μακριά από τη Γη, ώστε οι ακτίνες του φτάνουν σε αυτήν ουσιαστικά παράλληλες. Στη συνέχεια συνέκρινε, την ίδια χρονική στιγμή, τη διεύθυνση των ηλιακών ακτίνων με τη διεύθυνση της κατακόρυφου στις δύο διαφορετικές πόλεις (Συήνη και Αλεξάνδρεια). Πώς μπόρεσε όμως ο Ερατοσθένης να πραγματοποιήσει δύο μετρήσεις σε δύο διαφορετικά σημεία της Γης την ίδια χρονική στιγμή, εφόσον οι αρχαίοι Έλληνες δεν διέθεταν ρολόγια που θα μπορούσαν να συγχρονίσουν;

Το πρόβλημα το έλυσε κάνοντας τις μετρήσεις του κατά τη μεσημβρία (την ώρα δηλαδή που ο ήλιος βρίσκεται στο ψηλότερο σημείο του στον ουρανό) σε δύο πόλεις που βρίσκονται πάνω στον ίδιο μεσημβρινό, όπου κάθε μεσημβρινός είναι μια γραμμή που ενώνει τον βόρειο με τον νότιο πόλο της Γης (Σχήμα 2). Όσοι τόποι βρίσκονται πάνω στον ίδιο μεσημβρινό, έχουν μεσημέρι την ίδια χρονική στιγμή. Και πράγματι, η Αλεξάνδρεια και η Συήνη βρίσκονται σχεδόν στον ίδιο μεσημβρινό απέχοντας κατά γεωγραφικό μήκος μόλις 3°, με βάση

σημερινούς υπολογισμούς. Γνωρίζοντας ότι στη Συήνη, κατά τη μεσημβρία του θερινού ηλιοστασίου, ο ήλιος κατοπτρίζονταν ολόκληρος στον πυθμένα ενός πηγαδιού, αυτό σήμαινε ότι εκείνη τη στιγμή ο ήλιος βρισκόταν στην κατακόρυφο του τόπου (στο Ζενίθ του). Την ίδια χρονική στιγμή, τοποθετώντας στο έδαφος της Αλεξάνδρειας μια κατακόρυφη ράβδο, υπολόγισε τη γωνία πρόσπτωσης των ηλιακών ακτίνων με το κατακόρυφο επίπεδο: μέσω της εφαπτομένης της, γνωρίζοντας το μήκος της ράβδου και μετρώντας το μήκος της σκιάς της. Η γωνία υπολογίστηκε σε περίπου 7,2°. Η γωνία αυτή αντιστοιχεί ουσιαστικά στη γωνία ανάμεσα στην ακτίνα της Γης που καταλήγει στη Συήνη και την ακτίνα της Γης που καταλήγει στην Αλεξάνδρεια (Σχήμα 1).



Σχήμα 2: Οι πόλεις Αλεξάνδρεια και Συήνη βρίσκονται σχεδόν πάνω στον ίδιο μεσημβρινό (Πηγή σχήματος: <https://oceanservice.noaa.gov>)

Απόσταση Συήνης – Αλεξάνδρειας

Ένα δεύτερο στοιχείο που χρειάστηκε για να προχωρήσει στον υπολογισμό της περιφέρειας της Γης ήταν η απόσταση μεταξύ των δύο πόλεων. Πώς υπολόγισε ο Ερατοσθένης αυτήν την απόσταση; Κάποιοι μελετητές ισχυρίζονται ότι την υπολόγισε με βάση τη σταθερή ταχύτητα με την οποία ταξίδευαν τα καραβάνια -100 στάδια την ημέρα- επί 50 ημέρες, δηλαδή 5.000 στάδια συνολικά ή 820 km (1 αττικό στάδιο = 164 m.) Από άλλες πηγές, αυτή η απόσταση προκύπτει από αιγυπτιακούς τοπογραφικούς χάρτες, όπου οι μετρήσεις είχαν γίνει από επαγγελματίες «βηματιστές», οι οποίοι περπατώντας με σταθερούς διασκελισμούς κατέγραφαν αποστάσεις.

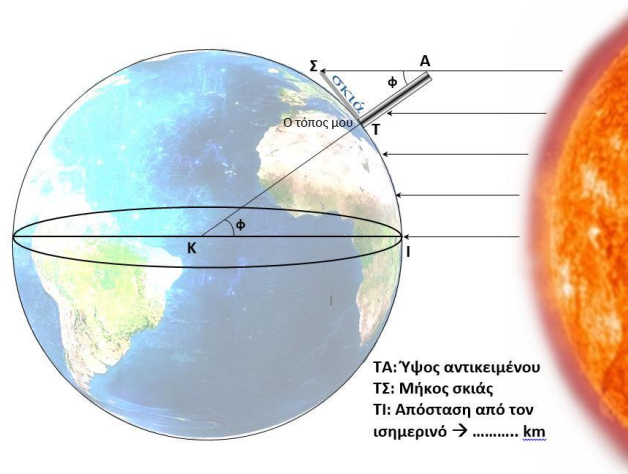
Τελικός υπολογισμός

Εφόσον σε γωνία 7,2° αντιστοιχεί απόσταση 5.000 σταδίων στην περιφέρεια της Γης, ο Ερατοσθένης συμπεράνει ότι στις 360° αντιστοιχεί απόσταση 250.000 σταδίων, που ισοδυναμεί σε 40.000 km, που είναι και η περιφέρεια του πλανήτη μας. Το λάθος στον υπολογισμό ήταν μόνο 2%: ένα πραγματικά αξιοσημείωτο επίτευγμα, δεδομένου ότι οι υπολογισμοί πραγματοποιήθηκαν πριν από περίπου 2,5 χιλιάδες χρόνια. Ο Ερατοσθένης, ως ο πρώτος άνθρωπος που μετρήσε τις διαστάσεις του πλανήτη μας, θεωρείται και ο πατέρας της μαθηματικής γεωγραφίας.

ΟΔΗΓΙΕΣ ΠΕΙΡΑΜΑΤΟΣ

Αν θεωρήσουμε ότι ο κύκλος στο διπλανό σχήμα είναι η Γη τότε η έλλειψη στο κέντρο είναι ο ισημερινός. Τις ημέρες κοντά στην εαρινή ισημερία, όσοι βρίσκονται στον ισημερινό της Γης θα παρατηρήσουν ότι ο Ήλιος το μεσημέρι βρίσκεται πολύ κοντά στο ζενίθ. Επομένως οι ακτίνες πέφτουν κατακόρυφα και ο Ήλιος θα μπορούσε να καθρεφτίζεται στον πυθμένα ενός πηγαδιού. Η προέκταση μιας ακτίνας του Ήλιου είναι η ΙΚ και περνάει από το κέντρο της Γης Κ. Έστω ότι εμείς

είμαστε στη θέση Τ. Αν τοποθετήσουμε μια κατακόρυφη ράβδο ΤΑ=Ycm τότε αυτή το μεσημέρι έχει σκιά ΤΣ=Xcm. Η κατάλληλη ώρα που πρέπει να κάνετε τη μέτρησή σας για κάθε τόπο υπολογίζεται από [εδώ](#).



Υπολογίζουμε την εφαπτομένη της γωνίας ΣΑΤ από το λόγο Χ/Υ και έτσι βρίσκουμε την γωνία που είναι φ μοίρες. Η γωνία φ είναι ίση με την επίκεντρη γωνία ΤΚΙ. Το γεωγραφικό πλάτος της θέσης μας είναι φ μοίρες. Παρατήρηση: Η γωνία φ είναι ίση με το γεωγραφικό πλάτος μόνο αν η μέτρηση γίνει τις μέρες της εαρινής ή φθινοπωρινής ισημερίας.

Η απόσταση από τον ισημερινό ΤΙ=S υπολογίζεται από το [Google Earth](#) ή από [εδώ](#).

Η περίμετρος της Γης και η ακτίνα της R υπολογίζονται χρησιμοποιώντας τις ακόλουθες μαθηματικές σχέσεις:

$$\text{Περμ. Γης} = \frac{360}{\phi} * S$$

$$R = \frac{\text{Περμ. Γης}}{2 * \pi}$$

Μπορείτε να κατεβάσετε το Φύλλο Εργασίας από [εδώ](#).

Μπορείτε επίσης να παρακολουθήσετε την περιγραφή του ιστορικού πειράματος του Ερατοσθένη από τον Carl Sagan, στο video που ακολουθεί.



Carl Sagan - Cosmos – Eratosthenes
<https://www.youtube.com/watch?v=G8cbIWMvOrI>

<http://magazine.noa.gr/archives/3058>

ΝΕΑ ΑΠΟ ΤΙΣ ΕΛΛΗΝΙΚΕΣ ΚΑΙ ΔΙΕΘΝΕΙΣ ΓΕΩΤΕΧΝΙΚΕΣ ΕΝΩΣΕΙΣ



International Society for Soil Mechanics and Geotechnical Engineering

ISSMGE News & Information Circular February 2023

<https://www.issmge.org/news/issmge-news-and-information-circular-february-2023>

Communiqué about the Earthquake in Turkey:

Our dear geoengineers in Turkey and Syria, as president of the International Society for Soil Mechanics and Geotechnical Engineering, on behalf of the ISSMGE Board and geotechnical engineers around the globe, I like to express our sincere condolences and sympathy to the victims, their families, and your people suffering amid this devastating tragedy.

This disaster shows how far we still are from providing a safe environment in earthquake zones and understanding nature. I like to assure you that you are part of the geotechnical family; and to Dr. Rasin Duzceer and Dr. Talal Awad, presidents of the national geotechnical societies of Turkey and Syria, respectively, I am expressing our collegial solidarity and readiness to dispatch experts from member countries should you require any assistance in the technical reconnaissance covering this vast geographic zone affected by the quake.

For now, all our wishes go to the search and rescue teams in their mission of saving lives, with all our blessings and gratitude.

Sincerely
Dr. Marc Ballouz
President ISSMGE

1. ISSMGE INTERACTIVE TECHNICAL TALKS AVAILABLE FROM THE ISSMGE WEBSITE

[ISSMGE Interactive Technical Talk Episode 1: Tailings and Mine Waste \(TC221\)](#)

[ISSMGE Interactive Technical Talk Episode 2: Geomechanics and Geotechnical Engineering for Nuclear Waste Disposal \(TC308\)](#)

[ISSMGE Interactive Technical Talk Episode 3: Energy Geo-structures & Storage of Thermal Energy in the Ground \(TC308\)](#)

2. ISSMGE BULLETIN

The latest edition of the ISSMGE Bulletin (Volume 16, Issue 6, December 2022) is available from the [website](#).

3. 6th McClelland Lecture

Prof. Richard Jardine will be presenting the 6th ISSMGE McClelland Lecture ***Time-dependent vertical bearing behaviour of shallow foundations and driven piles*** in Imperial Colleges Great Hall on Tuesday 12th September 2023 at 1800hrs, as part of the [9th International SUT OSIG Conference Innovative Geotechnologies for Energy Transition](#) (12-14 September 2023)

4. ISSMGE FOUNDATION

The next deadline for receipt of applications for awards from the ISSMGE Foundation is the 31st May 2023. Click [here](#) for further information on the ISSMGE Foundation.

5. CONFERENCES

Member Societies, Technical Committees, Sister Societies and related organisation may add their events directly to the ISSMGE Events database via the link +SUBMIT EVENT at the top of the EVENTS page

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>. For updated information please refer to that specific event's website.

The following have been added or amended since the previous Circular:

ISSMGE EVENTS

PRAGUE GEOTECHNICAL DAYS ON "CYCLIC LOADING OF GEOTECHNICAL STRUCTURES" 22-05-2023 - 23-05-2023 AVR, Narodní 3, Prague 1, Czech Republic (22nd May); Charles University, Albertov 6, Prague 2 (23rd May), Czech Republic, Language: English; Organiser: Czech and Slovak Society for Soil Mechanics and Geotechnical Engineering, Charles University, SG Geotechnika a.s.; Contact person: David Masin; Address: Albertov 6; Phone: +420602384793; Email: masin@natur.cuni.cz; Website: <http://www.issmge.cz/PGD.htm>;

11TH INTERNATIONAL SYMPOSIUM OF GEOTECHNICAL ASPECTS OF UNDERGROUND CONSTRUCTION IN SOFT GROUND (IS-MACAU 2024) - 14-06-2024 - 17-06-2024 Macao SAR, Language: English; Organiser: State Key Laboratory of IoT for Smart City (IoTSC), Department of Civil and Environmental Engineering (University of Macau) and TC204 of the ISSMGE; Contact person: ZHENG GUAN; Address: Faculty of Science and Technology University of Macau, E11 Avenida da Universidade, Taipa, Macau, China; Phone: +85388229153; Fax: (853) 8822-2426; Email: ismacau2024@um.edu.mo; Website: <https://is-macau2024.skliotsc.um.edu.mo>; Email: ismacau2024@um.edu.mo

NON-ISSMGE EVENTS

INTERNATIONAL FOUNDATION CONGRESS AND EQUIPMENT EXPO - 07-05-2024 - 10-05-2024 Hyatt Regency Dallas, TX, United States; Language: English; Organiser: DFI, ADSC, GeoInstitute of ASCE, PDCA; Contact person: Peggy Hagerty-Duffy; Address: PO Box 93583; Phone: (469) 359-6000; Email: phd@adsc-iafd.com; Website: <http://ifcee2024.com>; Email: adsc@adsc-iafd.com

DFI 49TH ANNUAL CONFERENCE ON DEEP FOUNDATIONS - 07-10-2024 - 10-10-2024 Gaylord Rockies Resort & Convention Center, Aurora, Colorado, United States; Language: English; Organiser: Deep Foundations Institute (DFI); Contact person: Angie Gible; Address: 326 Lafayette Avenue; Phone: 1-973-423-4030; Email: agible@dfi.org;

Website: <http://www.dfi.org/annual2024>;
Email: events@dfi.org

ISSMGE News
www.issmge.org/news

Technical Workshop on Landslide Warning and Prediction using IoT and Machine Learning

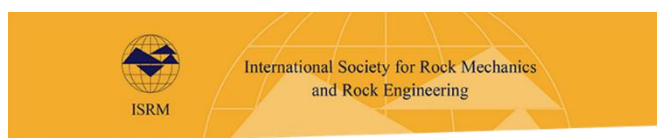
Zhongqiang Liu / [TC309](#) / 15-02-2023

Joint Technical Workshop (WG8 LandAware & ISSMGE TC309) on Landslide Warning and Prediction using IoT and Machine Learning

February 23, 2023 09:00-12:00 CET

Teams Meeting ID: 331 710 067 783, Passcode: V6tSh9

Technical Program ([download](#))



Suggested Methods Videos



Based on the cooperation between several universities and Rock Mechanics Laboratories and the ISRM Commissions on Testing Methods and on Education, video films on the ISRM Suggested Methods, which are made for educational purposes, will be embedded on the website of the Commission on Testing Methods.

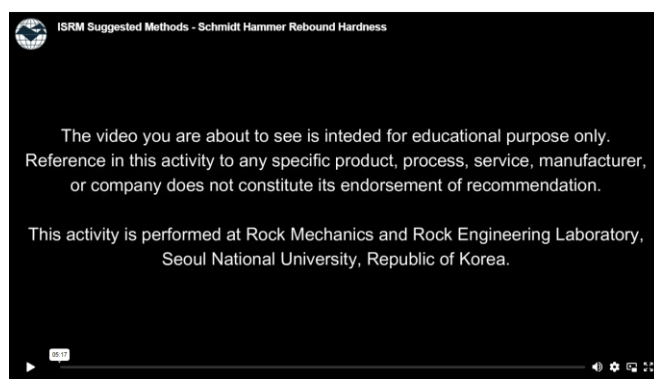
This initiative is an attempt to provide detailed explanations on the ISRM Suggested Methods. Ten videos have been recorded from experiments conducted in the Rock Mechanics and Rock Engineering Laboratory of the Seoul National University, South Korea, the Laboratorio de Mecánica de Suelos e Rocas of the Alicante University, and the Laboratorio de Geotecnia (Geotechnical Laboratory) of the CEDEX (Madrid, Spain).

This page will be updated regularly with new videos.

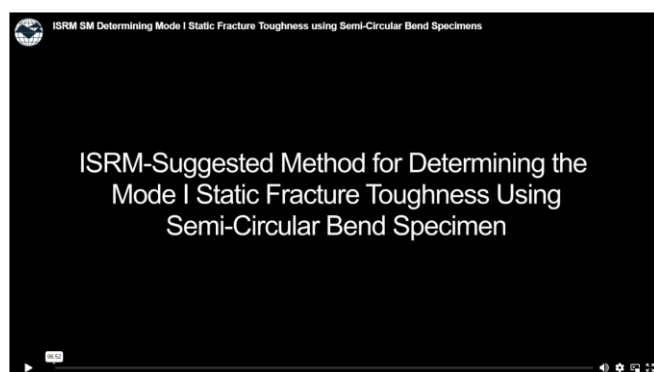
- [ISRM SM Determining Mode I Static Fracture Toughness using Semi-Circular Bend Specimens \(2024\)](#)
- [Suggested Method on Schmidt Hammer Rebound Hardness \(2024\)](#)

- [Suggested Method on Needle Penetration Test \(2021\)](#)
- [Suggested Methods for Determining Direct Tensile Strength of Rock Materials \(Part 1: Suggested Method for Determining Tensile Strength\) \(2021\)](#)
- [Strength of Rock Materials in Triaxial Compression \(2020\)](#)
- [Basic Friction Angle of Planar Rock Surfaces by Means of Tilt Tests \(2019\)](#)
- [Shear Strength of Rock Joints \(2018\)](#)
- [Water Content, Porosity, Density, and Wave Velocity \(2018\)](#)
- [Brazilian Tension Test \(2018\)](#)
- [Uniaxial Compressive Strength and Deformability of Rock Material \(2018 revised version\)](#)
- [Point Load Strength \(2016\)](#)
- [Basic Rock Sample Preparation \(2016\)](#)

Schmidt Hammer Rebound Hardness (2024)



Suggested Method Determining Mode I Static Fracture Toughness using Semi-Circular Bend Specimens (2024)



This video was prepared by the [Laboratorio de Mecánica de Rocas](#) of the Universidad da Coruna.

News

<https://www.isrm.net>

ISRM Young Members' Seminar Series on 21st February 2024-02-08

The next Young Members' Seminar will take place on 21st February with presentations on Numerical Modelling of Rock Fracture, Rock Slope Failure, Hydraulic Fracture and Earth-

quake Engineering by ISRM young researchers from Korea, Indonesia, Japan and China.

Follow the link to read their bios and register at the [ISRM Young Members Seminar series page](#).

The 5th International Conference on Information Technology in Geo-Engineering 2024-02-16

The Joint Committee 2 (JCT2) on Representation of Geo-engineering Data cordially invites you to the 5th International Conference on Information Technology in Geo-Engineering (5th ICITG), to be held from 5 to 8 August 2024, in Golden, Colorado USA.

The deadline for full paper submission is Feb 29, 2024

[Click here for the conference website](#)

"International Workshop on Recent Advances in Rock Mechanics" in San José, Costa Rica, with the ISRM Board 2024-02-24

The Geotechnical Society of Costa Rica hosts the "International Workshop on Recent Advances in Rock Mechanics" in San José, on 1 March, in conjunction with the ISRM additional ISRM Board meeting that will take place on 29 February and 2 March.

The programme of the workshop can be downloaded [in Spanish](#) or [in English](#).

This first meeting of the 2023-2027 ISRM Board has as main objective to define and start implementing new initiatives for its 4-year term of office.



News

<https://about.ita-aites.org/news>

Join Us as an Individual Member! 14 February 2024

Joining ITA as an individual member is the best way to immerse yourself in the core of the global tunnelling and underground space community – Open the gateway to a universe of networking, exposure, and priceless insights awaits! Enter the global tunnelling landscape with our premium platform and a range of communication tools such as web portal, yearly World Tunnel Congress (WTC), global networking at international events, access to our newsletters and media resources, ITA library, project database

Enjoy the benefits of an Individual membership to ITA today: [Subscribe for Individual Members \(ita-aites.org\)](#)

Scooped by ITA-AITES #111, 13 February 2024

[Excavation of colossal caverns for Fermilab's DUNE experiment completed | USA](#)

[Thames Tideway Tunnel: A revolutionary solution to combat river pollution | UK](#)

[Fibre-reinforced concrete segments – From laboratory to large-scale tests | Austria](#)

[Detroit's abandoned tunnel systems open door to another world | USA](#)

[Digging into converged wireless networks](#)

[Namma Metro Pink Line updates: 91% tunnelling done, Pink Line launch in 2025 | India](#)

[Amtrak awards major Northeast Corridor tunnel contract | USA](#)

[Underground car parks could be used to heat water and save energy](#)

[Plan for Europe's huge new particle collider takes shape](#)

[Mumbai: BMC completes phase 3 tunnel excavation in Mithi River rejuvenation project | India](#)

Scooped by ITA-AITES #112, 27 February 2024

['Metro subway project will continue to completion' | Philippines](#)

[Metro Tunnel Artworks | Australia](#)

[India's deepest ventilation-evacuation shaft in Kolkata's East-West Metro](#)

[The incredible £5.9bn 'mega-tunnel' being built under major European city](#)

[Tunnel Zheleznitsa inaugurated in Bulgaria: the longest and most modern road tunnel in the country built with EU funds](#)

[Guangzhou & Shenzhen Metros to Connect in 2025 | China](#)

[Silvertown Tunnel opening advanced to early 2025 as cut and cover and road realignment progress | UK](#)

[Toronto's newest transit tunnels now stretch 5km and they're only getting longer | Canada](#)

[Historic breakthrough for HS2's longest tunnel | UK](#)

[9 of the longest underwater tunnels in the world](#)



Unveiling the Hong Kong Tuen Mun Chap Lap Kok (TMCLK) Subsea Tunnels:

Challenges, Innovations, and Lessons Learned for Future Projects

Speaker: Antoine Schwob

Thursday 8th February 2024, Institution of Civil Engineers,
1 Great George Street, Westminster, London



The TMCLK project was the winner for the Major Project of the Year in the over- €500M category of the ITA in 2019. The completed project provides an alternative access route to the Hong Kong International Airport located on Chek Lap Kok Island, which was only been accessible via the Tsing Ma Bridge. The project encompasses the design and construction of remarkable 4.5km twin-tube subsea tunnels, 57 cross passages, and a 500m cut and cover section. The TMCLK project was opened for public use in December 2020.

The project's challenges included cutting tools replacement at hyperbaric pressure up to 5.8 bar, shafts and tunnelling in newly reclaimed land, 17.6m diameter TBM tunnelling, a bespoke mini TBM for 41 subsea cross passages and more. The valuable experiences gained during this project have significantly contributed to innovations in the tunnel tunnelling industry, paving the way for future projects. Bouygues Travaux Publics and Dragages HK Limited, both subsidiaries of Bouygues Construction, collaborated as a joint venture to design and execute the project over a span of 7 years.

BTSYM February Lecture & Winter Social

How to demonstrate competence and safety in tunnel design – exploring the role of guidance and standards

Thursday 15th February 2024, Institution of Civil Engineers,
1 Great George Street, Westminster, London

[Register to watch on zoom](#)



Event information & Speakers:

Part 1 (Kieran Tully): Choose Wisely

The role of Eurocodes, British Standards, good practice, ethics and the ICE Code of Conduct all play their part in the design, development and implementation of engineering solutions, demonstrating independent judgement and responsibility and professional commitment. This portion of the talk is delivered by Kieran Tully, ICE Membership Development Officer and BTS member, who aims to show how these topics relate to the ICE attributes and professional judgement.

Part 2 (Christoph Eberle): Eurocode fundamentals for tunnels

The second part of this lecture will explore fundamental concepts within the Eurocodes including the safety concept, reliability management, recent changes in the latest EN 1992-1-1 (2023) revision, and how to design non-standardised products in the Eurocode context. This portion of the talk is delivered by Christoph Eberle, Technical Director at Mott MacDonald.

Who can attend:

This lecture is open to anyone interested in civil engineering & tunnels; it will benefit those undertaking design of tunnels, trainees (graduates and apprentices) working towards professional qualification with the ICE, and those who are supervising or mentoring trainees.

Please note that Part 1 will not be recorded in line with the ICE practice on membership preparation webinars. A recording of Part 2 will be made available on the BTS website.



ICOLD European Club Annual Newsletter

https://www.icold-cigb.org/userfiles/files/CIGB/Regional%20clubs/EurCOLD%20Newsletter_202401.pdf

Κυκλοφόρησε το πρώτο Annual Newsletter της EurCOLD, January 2024, Issue No. 1, με τα ακόλουθα περιεχόμενα:

- Preface
- Summary
- Activities 2023
- Activities 2024
- Closure

Σημειώνεται ότι EurCOLD President είναι η συνάδελφος κα Σέρα Λαζαρίδου.



News

[Extra Opportunities For Young Members At GeoAmericas2024](#), February 5, 2024

IGS Student and Young Members have even more ways to help them attend the 5th Pan-American Conference on Geosynthetics. As well as free and reduced rates [Read More »](#)

[Enter GeoAmericas2024 Corporate Case Study Contest](#) February 7, 2024

Corporate members have only a few weeks left for a chance to showcase their projects on a global stage. GeoAmericas 2024 is looking for entries [Read More »](#)

[Could Your Chapter Host GeoAmericas 2028?](#) February 9, 2024

Set the agenda for one of the IGS's flagship regional conferences by applying to host the 6th Pan-American Conference on Geosynthetics. Bidding is now open [Read More »](#)

[IGS Hits 6,000 Followers On LinkedIn](#) February 13, 2024

The IGS has added another 1,000 followers in the last year to its most popular online channel. The Society's digital presence continues to be energised [Read More »](#)

[Corporate Member Profile: The Pietrucha Group](#) February 14, 2024

*** Share your story! IGS Corporate Members have the chance to share more of the great work they do with a wider audience. Corporate Members [Read More »](#)

[Sustainability eBook Now In Greek!](#) February 15, 2024

The iconic IGS Sustainability eBook has just released its tenth translated version – in Greek. It joins editions already available in French, Spanish, Italian, German, [Read More »](#)

[Voting Now Open For IGS Council Elections!](#) February 20, 2024

Seventeen candidates are vying for your vote in the latest IGS Council elections. Six seats are being contested for a chance to join the IGS [Read More »](#)

εξέτρεπαν ποτάμια και κατασκεύαζαν διώρυγες, γέφυρες και λιμάνια χι-λιάδες χρόνια πριν από εμάς.

Περιγραφή του Μαθήματος

Αυτό το πρώτο μέρος του μαθήματος της Αρχαίας Ελληνικής Τεχνολογίας υπογραμμίζει, καταρχάς, τη βασική σημασία της τεχνολογίας σε κάθε πολιτισμό καθώς και την ιδιαίτερη θέση που παίρνει στη μυθολογία των λαών. Αυτή η εναρκτική θέση τεκμηριώνεται στην περίπτωση της Αρχαίας Ελληνικής Τεχνολογίας με αναφορά στα ομηρικά έπη και στην ευρύτερη ελληνική μυθολογία.

Κατόπιν, αρχίζει μια λεπτομερής παρουσίαση των επιμέρους τεχνολογιών, ξεκινώντας από τις πιο αρχέγονες, όπως την ξυλουργική, την κεραμουργία και τη μεταλλουργία. Για κάθε μια από αυτές δίνονται στοιχεία από την αρχαία ελληνική γραμματεία και σύντομες περιγραφές των εφαρμοζόμενων αντίστοιχων τεχνικών μεθόδων. Ειδικότερα βέβαια για τη μεταλλουργία, αναπτύσσεται η κυρία πηγή τεχνικοοικονομικής ανάπτυξης των Αθηνών, που ήταν το Λαύριο.

Ακολουθούν οι επόμενες, κατά σειράν εμφάνισης, στην εξέλιξη του ανθρώπου τεχνολογίες, οι οποίες σήμερα θα ονομάζονταν τεχνολογίες του πολιτικού μηχανικού: κατά πρώτον, περιγράφονται οι οικοδομικές μέθοδοι, κατόπιν οι τύποι των γεφυρών οι οποίες στην ελληνική αρχαιότητα ήταν παλαιότερα μεν ξύλινες, αργότερα δε λίθινες με χρήση και του θολού. Ακολουθεί μια περιγραφή γεωτεχνολογιών (θεμελιώσεις, πάσσαλοι, τοίχοι αντιστήριξης, βελτιώσεις εδαφών) και το μέρος αυτού του μαθήματος ολοκληρώνεται με λεπτομερή αναφορά στα λιμενικά έργα της ελληνικής αρχαιότητας καθώς και στις διώρυγες που είχαν διανοίξει οι Έλληνες, για την εξυπηρέτηση του μεγάλης εκτάσεως εμπορίου στη μεσόγειο όπως και για τις πολεμικές τους ανάγκες.

Διδάσκων: **Θεοδόσιος Τάσιος**



<https://mathesis.cup.gr/courses/course-v1:GreekCivilization+GC+24A/about>

Ο καινούριος κύκλος μαθημάτων του Mathesis βρίσκεται ήδη στην πλατφόρμα μας! ...

Θα γνωρίσουμε επίσης την [τεχνολογία των αρχαίων Ελλήνων](#) και τους τρόπους με τους οποίους οι πρόγονοί μας

ΔΙΑΚΡΙΣΕΙΣ ΕΛΛΗΝΩΝ ΓΕΩΤΕΧΝΙΚΩΝ ΜΗΧΑΝΙΚΩΝ

Η Γιούλη Δουλαλά-Rigby περιλαμβάνεται στον κατάλογο των Top 20 most inspiring women in Ground Engineering's March 2024 issue!



Ground Engineering's March 2024 issue reveals the top 20 most inspiring women working in ground engineering.



Read the full issue [here](#).

(Thames Menteth / Ground Engineering, 14 February, 2024,
<https://www.geplus.co.uk/features/top-20-women-in-ground-engineering-industry-influencers-08-03-2024/>)

ΠΡΟΣΕΧΕΙΣ ΓΕΩΤΕΧΝΙΚΕΣ ΕΚΔΗΛΩΣΕΙΣ

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

IENTA Southeast Asian Conference and Exhibition on Tunneling and Underground Space 2024 (SEACETUS2024), 05 - 07 March 2024, Kuala Lumpur, Malaysia, <https://sub-mit.confbay.com/conf/seacetus2024>

7th International Conference Series on Geotechnics, Civil Engineering and Structures (CIGOS), April 4-5, 2024, Ho Chi Minh City, Vietnam, <https://cigos2024.sciencesconf.org>

International Seminar on Successes and Failures: What did we learn? April 11, 2024, Copenhagen, Denmark, www.dfi-events.org/copenhagen2024

EGU General Assembly 2024 / Session NH9.6 - Natural hazards' impact on natural and built heritage and infrastructure in urban and rural zones, 14-19 April 2024, Vienna, Austria & Online, <https://meetingorganizer.copernicus.org/EGU24/session/48709>

ICGE-2024 - Fourth International Conference on Geotechnical Engineering-Iraq and WICES-2024 - Warith First International Conference of Engineering Sciences, 17-18th April 2024, Karbala, Iraq, <https://wices.org>

World Tunnel Congress 2024 19 to 25, April, 2024, Shenzhen China, www.wtc2024.cn

PILING AND FOUNDATIONS 2024, 23 April 2024, London, United Kingdom, <https://piling.qeplus.co.uk/2024/en/page/home>

ICGE'24 International Conference of Geotechnical Engineering, April 25-27, 2024, Hammamet, Tunisia www.icge24.com

GEO AMERICAS 2024 5th Pan-American Conference on Geosynthetics Connecting State of the Art to State of Practice April 28 - May 1, 2024, Toronto, Canada, www.geoamericas2024.org

IFCEE 2024 International Foundation Congress and Equipment Expo, May 7-10, 2024, Dallas, USA <https://web.cvent.com/event/c42dd622-dd91-409f-b249-2738e31c9ef5/summary>

8th International Conference on Earthquake Geotechnical Engineering (8ICEGE), 7-10 May, 2024 Osaka, Japan, <https://confit.atlas.jp/guide/event/icege8/top?lang=en>

GeoShanghai 2024 International Conference on Geotechnical Engineering, May 26 - 29, 2024, Shanghai, China, www.geo-shanghai.org

2nd annual Conference on Foundation Decarbonization and Re-use, May 28-30 2024, Amsterdam, The Netherlands, <https://foundationreuse.com>

IS-Macau 2024 11th International Symposium of Geotechnical Aspects of Underground Construction in Soft Ground, June 14-17, 2024, Macao SAR, China, <https://is-macau2024.skli-otsc.um.edu.mo>

ISC'7 7th International Conference on Geotechnical and Geophysical Site Characterization "Ground models, from big data to engineering judgement", June 18-21, 2024, Barcelona, Spain, <https://isc7.cimne.com>

28th European Young Geotechnical Engineers Conference 2024, 25 to 29 June 2024, Demir Kapija, North Macedonia, <https://eygec2024.net>

WCEE2024 18th World Conference on Earthquake Engineering, June 30 - July 5, 2024, Milan, Italy, www.wcee2024.it

WCEE2024 18th World Conference on Earthquake Engineering, June 30 - July 5, 2024, Milan, Italy, www.wcee2024.it / Session SHR-7: When science meets industry: advances in engineering seismology stemming from engineering practice, olga.ktenidou@gmail.com

3rd ICPE 2024 Third International Conference on Press-in Engineering, 3-5 July 2024, Singapore, <https://2024.icpe-ipa.org>

EGRWSE-2024 5th International Conference on Environmental Geotechnology, Recycled Waste Materials and Sustainable Engineering, July 4-6th, Warsaw, Poland, <https://iil.sggw.edu.pl/egrwse-2024>

ICEC2024 SECOND INTERNATIONAL CONFERENCE ON EARTHEN CONSTRUCTION, 8-10 July 2024, Edinburgh, United Kingdom, <https://icec2024.eng.ed.ac.uk>, <https://icec2024.sciencesconf.org>

IS Landslides 2024 International Symposium on Landslides "Landslides across the scales: from the fundamentals to engineering applications" & IS Rock Slope Stability 2024, July 8-12th, 2024, Chambéry, France, www.isl2024.com

EUROCK 2024 ISRM European Rock Mechanics Symposium New challenges in rock mechanics and rock engineering July 15-19, 2024, Alicante, Spain, www.eurock2024.com

5th ICITG 5th International Conference on Information Technology in Geo-Engineering, August 5-8, 2024, Golden, Colorado, USA, <https://learn.mines.edu/ICITG>

S3: Slopes, Support and Stabilization, August 6-8, 2024, Aurora, Colorado, USA, <https://s3.amazonaws.com/xcd-shared/dfi/Media/S324/2024-S3-CFA-20230807.pdf>

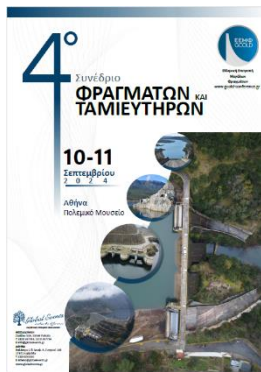
ECSMGE 24 XVIII European Conference on Soil Mechanics and Geotechnical Engineering, 26-30 August 2024, Lisbon, Portugal, www.ecsmge-2024.com

ISIC 2024 4th International Conference of International Society for Intelligent Construction, 10 - 12 September 2024, Orlando, United States, www.is-ic.org/conferences/2024-isic-international-conference

International Symposium on Dams and Earthquakes, 7th Meeting of the EWG, 12 -13 September 2024, Athens, Greece, [link](#).

NGM 2024 19th Nordic Geotechnical Meeting, 18th - 20th of September 2024, Göteborg, Sweden, www.ngm2024.se





**4ο Συνέδριο Φραγμάτων και Ταμιευτήρων
10 και 11 Σεπτεμβρίου 2024, Αθήνα
www.qcold-conference.gr**

Αγαπητά μέλη της ΕΕΜΦ, αγαπητοί φίλοι των Φραγμάτων,

οι άνθρωποι κάθε εποχής συνηθίζουν να μιλούν για τις ιδιαίτερες συνθήκες και προκλήσεις της εποχής τους. Και η εποχή που ζούμε πιστεύουμε ότι είναι ξεχωριστή, λόγω του βάρους που φέρει και των νέων οριζώντων που ανοίγονται.

Μετά από μια μακρά περίοδο ευημερίας, αντιμετωπίσαμε διαδοχικά οικονομικές, υγειονομικές και ενεργειακές κρίσεις, ενώ ταυτόχρονα μεταλλάσσουμε τις κοινωνίες και τις οικονομίες μας ώστε να αποφύγουμε ή να μετριάσουμε τις κλιματικές κρίσεις.

Στη χώρα μας, που χτυπήθηκε ιδιαίτερα από το αλλεπάλληλο των κρίσεων, προσπαθούμε επιπλέον να τακτοποιήσουμε και να νοικοκυρέψουμε τους πόρους και τις υποδομές μας προς την κατεύθυνση της βέλτιστης διαχείρισης και της ασφάλειας

Με όλα αυτά να συμβαίνουν γύρω μας νομίζουμε ότι δεν υπήρξε πιο κατάλληλη εποχή να ανοίξουμε τη συζήτηση σχετικά με τα φράγματα ως κομμάτι της οικονομίας μας, ως απαραίτητα εργαλεία για την ενεργειακή μετάβαση, ως απαραίτητα στοιχεία της βέλτιστης διαχείρισης των υδατικών πόρων μας, ως κατασκευές που έχουν ανάγκη τη φροντίδα και τη γνώση για να εξυπηρετήσουν το ρόλο τους με ασφάλεια.

Ας ξανασυναντηθούμε λοιπόν από κοντά για να μιλήσουμε τεχνικά, για τις προόδους και τις ανησυχίες μας, αλλά και ανθρώπινα, για όσα δεν είπαμε τόσο καιρό που κρατάγαμε τις κοινωνικές αποστάσεις.

Προσβλέποντας στη διεπιστημονική αλλά και την διακοινωνική επικοινωνία, η Ελληνική Επιτροπή Μεγάλων Φραγμάτων διοργανώνει το 4ο Συνέδριο Φραγμάτων και Ταμιευτήρων στην Αθήνα, στις 20-22/9/2023, με τη φιλοδοξία αυτό να αποτελέσει μοχλό τεχνικής πρόοδου και εφαλτήριο ανάπτυξης.

Σας καλούμε λοιπόν να συμμετάσχετε στις εργασίες του Συνεδρίου και να αποστείλετε εργασίες σχετικές με το θεματολόγιο που παρουσιάζεται παρακάτω.

1. Ενέργεια - Αντλησιοταμίευση και Φράγματα
2. Κοινωνικά Θέματα / Ενημέρωση / Δημοσιά Εικόνα των Φραγμάτων
3. Καινοτομίες στο Σχεδιασμό, την Κατασκευή και την Παρακολούθηση Φραγμάτων
4. Αναβάθμιση Φραγμάτων: Ασφάλεια – Απόδοση
5. Λειτουργία / Συντήρηση και Διαχείριση Κρίσεων
6. Διαχείριση Υδάτινων Πόρων / Υδρολογία & Κλιματική Αλλαγή
7. Διαχείριση Ταμιευτήρων / Πλημμυρών / Φερτών Υλών
8. Περιβαλλοντικός Σχεδιασμός Φραγμάτων / Οικο-Υδρολογία & Οικο-Υδραυλική



ISRM International Symposium 2024 and 13th Asian Rock Mechanics Symposium (ARMS13), 22 to 27 September 2024, New Delhi, India, <https://arms2024.org>

IS-Grenoble 2024 Geomechanics from Micro to Macro, September 23-27, 2024, Grenoble, France, <https://is-grenoble2024.sciencesconf.org>

International Symposium on Dams and Earthquakes, 7th Meeting of EWG, September 25-27, 2024, Athens, www.eemf.gr

92nd ICOLD Annual Meeting & International Symposium on Dams for People, Water, Environment and Development, 29th September – 3rd October, 2024, New Delhi, India, www.icold2024.org

5th European Conference on Physical Modelling In Geotechnics, 02 to 04 October 2024, Delft, Netherlands, <https://tc104-issmqe.com/ecpmg-2024>

XVIII African Regional Conference on Soil Mechanics and Geotechnical Engineering, 06 ÷ 09 October 2024, Algiers, Algeria, <https://algeos-dz.com/18ARC.html>

RMCC2023 1st International Rock Mass Classification Conference "Rock Mass Classification meets the Challenges of the 21st Century", 30-31 October 2024, Oslo, Norway, www.rmcc2024.com

PANAMGEO CHILE 2024 17th Pan-American Conference on Soil Mechanics and Geotechnical Engineering, 12-17 November 2024, La Serena, Chile, <https://panamge-ochile2024.cl>

CouFrac 2024 The 4th International Conference on Coupled Processes in Fractured Geological Media: Observation, Modeling, and Application, November 13-15, 2024, Kyoto, Japan, <https://www.ec-convention.com/coufrac2024/>

3ο Διεθνές Συνέδριο Αρχαίας Ελληνικής και Βυζαντινής Τεχνολογία, 19-20-21 Νοεμβρίου 2024, Αθήνα, www.edabyt.gr

ICTG 2024 5th International Conference on Transportation Geotechnics 2024 "Sustainable and Evolving Technologies for Urban Transport Infrastructure", 20 – 22 November 2024, Sydney, Australia www.ictg2024.com.au

Geotechnics for Sustainable Infrastructure, 28-29 November 2024, Kathmandu, Nepal, <https://geomandu.ngeotechs.org>

ISFOF 2025 5th International Symposium on Frontiers in Offshore Geotechnics, June 9-13, 2025, Nantes, France, <https://isfof2025.univ-gustave-eiffel.fr>

World Tunnel Congress 2025 "Tunnelling into a sustainable future – methods and technologies", 9-15 May 2025, Stockholm, Sweden, www.wtc2025.se



Eurock 2025

**ISRM European Rock Mechanics Symposium
Expanding the underground space -
future development of the subsurface**

**- an ISRM Regional Symposium
16–20 June 2025, Trondheim, Norway**

Contact Person Name

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Norway



**21st International Conference on
Soil Mechanics and Geotechnical Engineering
14 – 19 June 2026, Vienna, Austria
www.icsmge2026.org/en**

In 1925 Karl Terzaghi published the book „Erdbaumechanik auf bodenphysikalischer Grundlage“. On the occasion of the 100th Anniversary of this publication the *Austrian Geotechnical Society* and the *Austrian Society for Geomechanics* are proud to host the 21st International Conference on Soil Mechanics and Geotechnical Engineering (ICSMGE) in Vienna, Austria.

Austrian Geotechnical Society and Austrian Society for Geomechanics

Contact person: Prof. Helmut F. Schweiger
Email: helmut.schweiger@tugraz.at



ISFMG 2026 12th International Symposium on Field Monitoring in Geomechanics, August 2026, Indian Institute of Technology Indore, India,
<https://sites.google.com/view/isfm2026/home>



**Eurock 2026
Risk Management in Rock Engineering -
an ISRM Regional Symposium
14-19 June 2026, Skopje, Republic North Macedonia**

Contact Person Name

Prof. Milorad Jovanovski
Email jovanovski@gf.ukim.edu.mk



**16th International Congress on Rock Mechanics
Rock Mechanics and Rock Engineering
Across the Borders
17-23 October 2027, Seoul, Korea**

Scope

The scope of the Congress will cover both conventional and emerging topics in broadly-defined rock mechanics and rock engineering. The themes of the Congress include but not be limited to the following areas:

- Fundamental rock mechanics
- Laboratory and field testing and physical modeling of rock mass
- Analytical and numerical methods in rock mechanics and rock engineering
- Underground excavations in civil and mining engineering
- Slope stability for rock engineering
- Rock mechanics for environmental impact
- Sustainable development for energy and mineral resources
- Petroleum geomechanics
- Rock dynamics
- Coupled processes in rock mass
- Underground storage for petroleum, gas, CO₂ and radioactive waste
- Rock mechanics for renewable energy resources
- Geomechanics for sustainable development of energy and mineral resources
- New frontiers & innovations of rock mechanics
- Artificial Intelligence, IoT, Big data and Mobile (AICBM) applications in rock mechanics
- Smart Mining and Digital Oil field for rock mechanics
- Rock Engineering as an appropriate technology
- Geomechanics and Rock Engineering for Official Development Assistance (ODA) program
- Rock mechanics as an interdisciplinary science and engineering
- Future of rock mechanics and geomechanics

Our motto for the congress is "Rock Mechanics and Rock Engineering Across the Borders". This logo embodies the interdisciplinary nature of rock mechanics and challenges of ISRM across all countries and generations.

The 25 January 2024 mine waste failure in the Hpakant mining area of Myanmar

On about 25 January 2024 a spectacular mine waste failure was caught on video in the Hpakant jade mining area of Myanmar

Satellite image of the aftermath of the January 2024 mine waste failure in Myanmar. Image copyright Planet Labs, used with permission, dated 31 January 2024.

Earlier this week [a video appeared on social media showing a mine waste failure](#). The video is remarkable – probably the best example of a progressive failure of a mine waste dam that has appeared to date.

There was little information about the failure, but using Twitter we were able to narrow it down to Myanmar. From there I was able to use [Planet Labs](#) images to identify the site.

This is the video:-



[https://www.youtube.com/watch?v= z2_IeqOBNg](https://www.youtube.com/watch?v=z2_IeqOBNg)

It is a truly astonishing sequence, showing very clearly the way in which the dam itself fails progressively, and then rapidly collapses once the breach is initiated.

The location is [25.6821, 96.3366]. This is a [Planet Labs](#) image of the site, collected on 24 January 2024:-



Satellite image of the site of the January 2024 mine waste failure in Myanmar. Image copyright [Planet Labs](#), used with permission, dated 24 January 2024.

This is the aftermath of the failure, also collected by [Planet Labs](#):-



Satellite image of the aftermath of the January 2024 mine waste failure in Myanmar. Image copyright [Planet Labs](#), used with permission, dated 31 January 2024.

The breach in the dam can be clearly seen, with a substantial drawdown of waste in the pond. Fortunately, it appears that there was a lower basin that has intercepted the mine waste, preventing further escape of the material:-

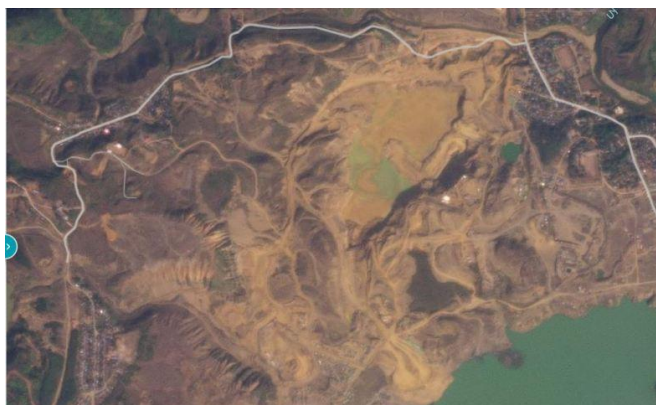


Satellite image of the aftermath of the January 2024 mine waste failure in Myanmar. Image copyright [Planet Labs](#), used with permission, dated 31 January 2024.

Judging by the archive imagery, it is likely that this failure occurred on 25 January 2024, although I cannot preclude it having been a day earlier.

The pond that was breached was about 350 x 350 metres. It is hard to know how much material has escaped, but let's assume that the level has fallen by 25 metres. This would give a volume of about 3 million cubic metres, so this was a very large event (as the video shows).

I have inserted a slider below so that you can compare the imagery, before and after:-



This area of Myanmar has a long and terrible history of landslides, [as previous posts on this blog have shown](#). Sadly, it shows no sign of getting any safer.

Reference

Planet Team (2024). Planet Application Program Interface: In Space for Life on Earth. San Francisco, CA.
<https://www.planet.com/>

(Dave Petley / THE LANDSLIDE BLOG, 2 February 2024, <https://eos.org/thelandslideblog/myanmar-1>)

ΕΝΔΙΑΦΕΡΟΝΤΑ - ΣΕΙΣΜΟΙ & ΑΝΤΙΣΕΙΣΜΙΚΗ ΜΗΧΑΝΙΚΗ

Advanced modeling uncovers seamounts as the source of Japan's tsunami earthquakes



A recent study challenges the prevailing hypothesis that subducted seamounts are weakly coupled and slide aseismically, suggesting that they act as strong asperities causing significant earthquakes instead. Through modeling and analysis, researchers have debunked the weak asperity model, providing a new explanation for the source of historical tsunami earthquakes along the southern Japan Trench, including the 1677 M8.3–8.6 Enpo Boso-oki event.

Key findings:

- The weak asperity hypothesis, based on the behavior of a seamount in the southern Japan Trench, is refuted.
- Strong asperities are necessary to explain the occurrence of large earthquakes and the long recurrence times observed.

The research, published recently in JGR Solid Earth has critically examined the widely accepted theory that subducted seamounts under the ocean's surface are weakly coupled, proposing a strong asperity model that significantly alters our understanding of earthquake mechanisms.

Through a comprehensive examination of the case study in the southern Japan Trench, the authors provide compelling evidence and modeling results that refute the accepted hypothesis and present a new understanding of the seismic mechanisms associated with subducted seamounts.

According to the authors, their research is based on an abundance of new data, meticulous analysis, and advanced modeling techniques. It demonstrates that only steady-state stable sliding occurs in a weak asperity model whereas seamount acts as a stationary buttress, leading to the occurrence of 'hang-up earthquakes' in the stable sliding region.

This research challenges a decade-long scientific consensus and enhances our understanding of the seismic risk associated with subducted seamounts. Recognizing the strong coupling effect of seamounts provides a more accurate framework for predicting earthquake and tsunami patterns.

By debunking the weak asperity model and advocating for a strong asperity perspective, the study offers new insights into earthquake dynamics, emphasizing the critical role of subducted seamounts in initiating significant seismic events.

This advancement in seismic research could lead to improved earthquake prediction and mitigation strategies.

References:

¹ Do Subducted Seamounts Act as Weak Asperities? – Sungho Lee, Eunseo Choi, Christopher H. Scholz – AGU/JGR Solid Earth – November 20, 2023 – <https://doi.org/10.1029/2023JB027551>

Featured image credit: Mike Norton

(THE WATCHERS, Sunday, February 18, 2024, <https://watchers.news/2024/02/18/advanced-modeling-uncovers-seamounts-as-the-source-of-japans-tsunami-earthquakes/>)



New EQFL metric evaluates the impact of earthquakes on countries over the past five centuries



Researchers at the International Centre for Earth Simulation Foundation, led by Max Wyss, have developed the Earthquake Fatality Load (EQFL), a new metric for assessing the impact of earthquakes by focusing on human fatalities relative to a country's population.

- Among 35 seismically important countries with adequate data Ecuador, Lebanon, Haiti, Turkmenistan, Iran, and Portugal have experienced the greatest loads during the last five centuries

Wyss and his team analyzed earthquake data dating back to 1500, calculating the EQFL for 35 countries and regions. This analysis, covering 97% of all earthquake-related fatalities, revealed that smaller countries such as Ecuador, Lebanon, Haiti, Turkmenistan, Iran, and Portugal are most affected when considering the proportion of their populations lost to earthquakes.

The study found that countries with minimal tectonic activity or slow fault deformation rates also ranked high in EQFL. This challenges the traditional focus on seismic hotspots, emphasizing the need to consider earthquake risk more broadly.

A notable trend is the global decrease in EQFL over the past 500 years, attributed to advancements in building technology, better emergency response systems, and urbanization. California, Colombia, Ecuador, and Mexico have shown the most significant decreases, while Italy has seen the smallest

decline, largely due to the challenge of modernizing its historic buildings.

The research highlights the importance of focusing on human lives in earthquake risk assessment and mitigation strategies. Max Wyss's involvement in developing QLARM, a real-time quake loss assessment service, underscores the potential for technology to improve disaster preparedness and response.

The introduction of the EQFL by Wyss and his colleagues offers a new lens through which to view earthquake impacts, prioritizing the human toll and encouraging the adoption of effective mitigation strategies to protect vulnerable populations worldwide.

References:

¹ The Earthquake Fatality Load: A Measure of Impact – Max Wyss et al. – Bulletin of the Seismological Society of America (2024) – <https://doi.org/10.1785/0120230187>

² The impact of earthquake fatalities on countries over past 500 years – Open Access Government – February 16, 2024

Featured image credit: Kepler Ribadeneira

(THE WATCHERS, Sunday, February 18, 2024,
<https://watchers.news/2024/02/18/new-egfl-metric-evaluates-the-impact-of-earthquakes-on-countries-over-the-past-five-centuries/>)

ΕΝΔΙΑΦΕΡΟΝΤΑ - ΓΕΩΛΟΓΙΑ

Santorini's volcanic past: underwater clues reveal giant prehistoric eruption

An expedition that drilled into the sea floor near the famous Greek island found signs of a gargantuan blast 520,000 years ago and more recent eruptions.



Santorini is a tourist haven and also the site of gigantic ancient eruptions. Credit: Marcos del Mazo/LightRocket via Getty

One of the world's most-studied volcanoes turns out to be hiding plenty of secrets. Geologists have unearthed major clues about past eruptions of the Greek island of Santorini by drilling into the sea floor around the partially submerged volcano.

Santorini is famous among volcanologists for its Bronze Age eruption in approximately 1600 bc, which might have contributed to the decline of the Minoan civilization on the island of Crete. Santorini is also home to more than 15,000 residents and attracts around 2 million tourists each year, who Instagram their way around the white- and blue-washed buildings set against the glittering sea.

During an expedition between late 2022 and early 2023, researchers discovered evidence of a previously unknown cataclysm. Half a million years ago, the volcano erupted violently enough to blanket three nearby islands in debris, and it sent underwater currents racing for 70 kilometres. The eruption was much larger than the one in 1600 bc and was one of the biggest ever in this part of the Mediterranean.

The expedition also pulled up evidence that Santorini erupted in the year ad 726 in a blast approximately the size of Mount St Helens' in Washington in 1980.

No one had understood the scale and scope of these eruptions until now. "The history of Santorini is being written again," says Paraskevi Nomikou, a marine geologist at the National and Kapodistrian University of Athens in Greece, who was a researcher on the expedition.

Although scientists aren't expecting similar eruptions to happen any time soon, the findings add to the growing understanding of the volcanic risk at Santorini, which last erupted in 1950. A related volcano, Kolumbo, lies underwater just 7 kilometres away; it last erupted in 1650 and is also considered active. Both Santorini and Kolumbo are part of the Hel-

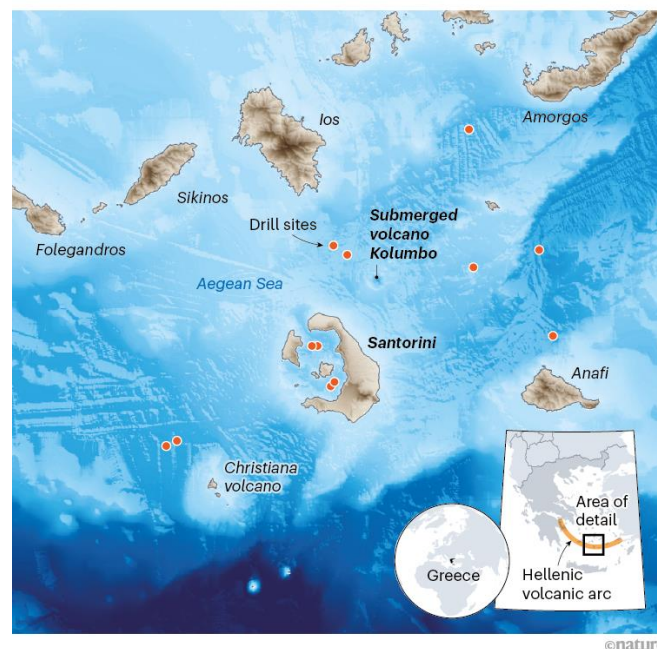
lenic volcanic arc, a chain of mostly underwater volcanoes that sit at the junction where the plate of Earth's crust that carries Africa dives beneath the Aegean Sea plate.

With its explosive history and thriving tourist trade, Santorini is one of the most hazardous volcanoes in Europe. Researchers have pieced together much of its eruptive past, by gathering evidence from rocks on land and from cores that could be obtained fairly easily from the top few metres of the Mediterranean sea floor. But part of Santorini's history is buried deep beneath the sea floor and had remained inaccessible.

That is, until the drill ship *JOIDES Resolution* arrived in December 2022 for a 2-month expedition; the researchers drilled 12 holes into the sea floor and pulled up long cores of sediment and rock in and around Santorini and Kolumbo (see 'Eruption clues'). "By going into the marine realm we can go further back in time," says Timothy Druitt, a volcanologist at the University of Clermont Auvergne in Clermont-Ferrand, France, and co-chief scientist of the expedition.

ERUPTION CLUES

Researchers drilled into the sea floor at 12 sites near the Greek island of Santorini and pulled up geological evidence of past eruptions, including a giant blast around 520,000 years ago.



Sources: Elevation: NASA; Bathymetry: EMODnet

The drilling around Santorini wasn't easy; several of the drill holes collapsed in a slurry of pumice and ash, which glommed onto drilling equipment like superglue. At one point, on New Year's Eve, technicians had to sever the pipe used for drilling, leaving some of it in the hole.

The many drilling challenges meant that "we had several days where we were just sitting there not knowing what to expect for the next days", says Steffen Kutterolf, a volcanologist at the GEOMAR Helmholtz Centre for Ocean Research in Kiel, Germany, and the expedition's other co-chief scientist. But ultimately, the team extracted an unprecedented data set about the region's volcanic past.

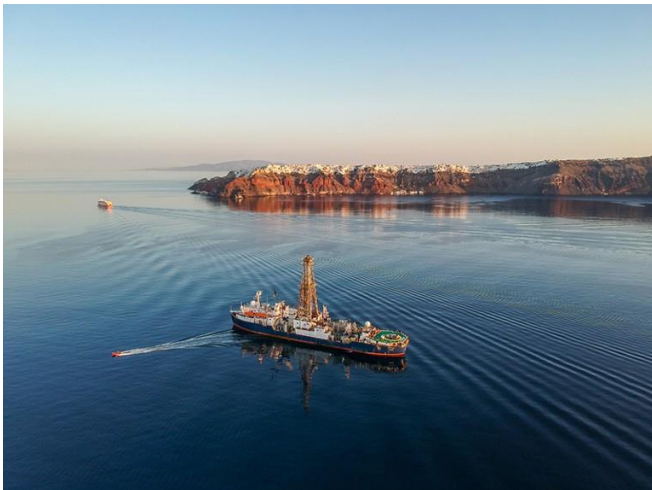
Some of that volcanic past involved submarine eruptions, in which most of the volcanic debris never reaches above the ocean surface. Learning about these eruptions is important because they can be powerful and are poorly understood: in January 2022, an underwater volcano exploded near Tonga in the [most violent eruption in decades](#), yet nearly all of the evidence that it happened remains beneath the waves.

Among the most significant discoveries at Santorini was a

thick layer of the volcanic rock called tuff, which kept appearing in core after core, created by a huge prehistoric eruption. "Slowly it began to dawn on us that this was a major [geological] unit we didn't know anything about," says Druitt. The researchers named it the Archaeos tuff, after the Greek word for 'ancient'. It formed around 520,000 years ago when Santorini erupted underwater, sending shards of ash and rock racing outwards like giant avalanches, the team reported in January in *Communications Earth & Environment*¹.

As measured by the size of those underwater flows, the eruption was 6 times larger than the 1600 bc eruption at Santorini and 10 times larger than the 2022 Tonga eruption. But Druitt says not to worry about such an ancient eruption: "There's absolutely no reason to think that Santorini is going to do anything like this in the near future."

More relevant to modern hazards is the discovery of how big the eruption in ad 726 was. Historical accounts relate that "the sea was seen to boil" that year, and that large blocks of pumice — lightweight rocks that often form during underwater eruptions — floated to the surface and travelled for hundreds of kilometres. But researchers had little information about the scale and nature of the eruption, Jonas Preine, a marine geophysicist at the University of Hamburg in Germany, said in December at a meeting of the American Geophysical Union in San Francisco. With the *JOIDES Resolution*, he said, the team aimed to "solve a historic mystery and find a lost eruption".



The *JOIDES Resolution* drill ship in Santorini. Credit: Thomas Ronge/IODP

The researchers did this by comparing rocks drilled during the expedition with information about the layering in the rocks beneath Santorini that comes from studies of seismic waves passing beneath the island. Preine and his colleagues concluded that they had indeed found widespread evidence of an eruption in ad 726².

"The 726 eruption has always been used as a worst-case scenario" for a modern eruption at Santorini, says Druitt. "What's interesting is, the worst-case scenario has just increased in magnitude quite a lot." Among other things, Preine's team found that the material from the ad 726 eruption is crumbly, meaning that a future eruption could destabilize that layer and lead to greater chances of underwater landslides, which could trigger tsunamis.

The ocean-drilling expedition has added important chapters to the scientific understanding of Santorini, says Emilie Hooft, a geophysicist at the University of Oregon in Eugene, who did not go on the expedition but who has been working to map the magma chambers beneath Santorini and Kolumbo³. "The history of the volcano was perceived to be so well known from all the work that was done on land," she says. And yet

"there's actually a lot to be discovered about the interaction with the eruptive system and the marine environment" — such as how those crumbly layers formed during the underwater eruption in ad 726.

Greek authorities regularly monitor geological activity at Santorini, by tracking earthquakes, movement of the ground and other changes. The *JOIDES Resolution* expedition was a high-profile chance to inform residents about the volcano's hazards, says Nomikou, who was born and raised on the island. She gave talks and virtual tours to school groups about how researchers are monitoring Santorini and neighbouring volcanoes. "There is no need for panic," she says.

Although magma continues to pool beneath Santorini, it also leaks out in minor eruptions such as those in the 1920s through to the 1940s that created small lava flows on uninhabited islands. The magma leakage takes some of the pressure off the system, Druitt says. Still, in 2011 and 2012, a months-long period of small earthquakes and ground shifts rattled Santorini, frightening the public and triggering emergency authorities to research evacuation scenarios. And the growing understanding of the threat of submarine eruptions means that researchers need to keep a particular eye on Kolumbo. Its crater floor is around 500 metres below sea level but the rim is around 20 metres beneath the waves.

Kolumbo's last eruption, in 1650, generated poisonous gases that killed around 70 people and many animals on Santorini. But Kolumbo is now monitored better than ever; over the past year, Nomikou has led an effort to install geochemical, seismic and other instruments on the sea floor around the volcano⁴. Early results show that Kolumbo has more than 300 active volcanic chimneys that spew carbon dioxide into the surrounding

"It's a very toxic environment," says Nomikou. And that's why she spends so much time educating people on Santorini about its unique risks: "They need to know that they are living in an active volcano."

Nature **626**, 252-253 (2024) doi: <https://doi.org/10.1038/d41586-024-00326-y>

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1. Druitt, T. *et al.* *Commun. Earth Environ.* **5**, 24 (2024). [Article](#) [Google Scholar](#)
2. Preine, P. *et al.* *Nature Geoscience* (in the press).
3. Chrapkiewicz, K. *et al.* *Geochem. Geophys. Geosys.* **23**, e2022GC10475 (2022). [Article](#) [Google Scholar](#)
4. Nomikou, P. *et al.* *Front. Mar. Sci.* **9**, 796376 (2022). [Article](#) [Google Scholar](#) [Download references](#)

(Alexandra Witze / *nature*, 06 February 2024, <https://www.nature.com/articles/d41586-024-00326-y>)



New study revises the origin of continents without the need for plate tectonics

A group of geoscientists have recently challenged the conventional understanding of continental formation by presenting evidence that the origins of continents can be explained by internal geological forces alone, without initiating plate tectonics. The study highlights

the role of oceanic plateaus in the early Earth's crustal development.



(Image credit: UBC)

A new study published last month reveals a revised narrative on how continents formed, focusing on internal forces within Earth's crust rather than the onset of plate tectonics. The findings, reported in *Nature Communications*, suggest that the continents' development stemmed from geological processes within oceanic plateaus during Earth's nascent stages.

The research, spearheaded by Dr. Matthijs Smit and his team at the University of British Columbia, delves into the enigma of the Archean Eon's continental crust formation, which spanned from 4 billion to 2.5 billion years ago.

The study's focus on the unique composition of tonalite, trondhjemite, and granodiorite (TTG) granitoid rocks, crucial to the early crust, led to a breakthrough in understanding their origin. By examining trace elements in these rocks, the researchers traced the TTG magmas back to their likely source, a type of gabbro, shedding light on the initial stages of continental crust formation.

Dr. Smit's remarks underline the ubiquity of such rocks, humorously noting that many kitchen countertops are made from the same material pivotal in crafting our modern continents. The study further illustrates that regions across North America, including vast areas of Canada, are composed of this ancient Archean crust, primarily formed from TTGs and their evolutionary granite counterparts.

Presenting a simple yet compelling model, the UBC researchers propose that the continental crust's evolution was a natural outcome of the slow burial, thickening, and melting of precursor crust resembling oceanic plateaus. This process led to the creation of TTGs, which played a critical role in the continents' enduring stability and expansion.

By establishing an "intra-crustal" mechanism for the formation of TTGs, the study challenges the long-held belief that these granitoid rocks originated in Earth's first subduction zones, marking the beginning of plate tectonics. This new understanding not only addresses the "chicken-and-egg" dilemma of whether plate tectonics or TTG magmatism came first but also negates the necessity for other mechanisms, like meteorite impacts, in explaining continental growth.

References:

¹ Archean continental crust formed from mafic cumulates – Smit, M.A., Musiyachenko, K.A. & Goumans, J. – *Nat Commun* 15, 692 (2024). <https://doi.org/10.1038/s41467-024-44849-4> – OPEN ACCESS

² Researchers uncover source rocks of the first real continents – University of British Columbia – January 31, 2024

(THE WATCHERS, Wednesday, February 7, 2024, <https://watchers.news/2024/02/07/new-study-revises-the-origin-of-continents-without-the-need-for-plate-tectonics>)

Archean continental crust formed from mafic cumulates

Matthijs A. Smit, Kira A. Musiyachenko & Jeroen Goumans

Abstract

Large swaths of juvenile crust with tonalite-trondhjemite-granodiorite (TTG) composition were added to the continental crust from about 3.5 billion years ago. Although TTG magmatism marked a pivotal step in early crustal growth and cratonisation, the petrogenetic processes, tectonic setting and sources of TTGs are not well known. Here, we investigate the composition and petrogenesis of Archean TTGs using high field-strength-element systematics. The Nb concentrations and Ti anomalies of TTGs show the overwhelming effects of amphibole and plagioclase fractionation and permit constraints on the composition of primary TTG melts. These melts are relatively incompatible element-poor and characterised by variably high La/Sm, Sm/Yb and Sr/Y, and positive Eu anomalies. Differences in these parameters are not indicative of melting depth, but instead track differences in the degree of melting and fractional crystallisation. Primary TTGs formed by the melting of rutile- and garnet-bearing plagioclase-cumulate rocks that resided in proto-continental roots. The partial melting of these rocks is part of a causal chain that links TTG magmatism to the formation of sanukitoids and K-rich granites. Together, these processes explain the growth and differentiation of the continental crust during the Archean without requiring external forcing such as meteorite impact or the start of global plate tectonics.

Nature Communications volume 15, Article number: 692 (2024),

<https://www.nature.com/articles/s41467-024-44849-4>



Stromatolites



The Stromatolites in Shark Bay, Australia. The stromatolites are about 2 billion years old and are the oldest living organisms on the planet. (Credit: Tourism WA).



Geomorphological Features

Stromatolites or **stromatoliths** (from Ancient Greek στρώμα, 'layer, stratum', and λίθος 'rock') are layered sedimentary formations (microbialite) that are created mainly by photosynthetic microorganisms such as cyanobacteria, sulfate-reducing bacteria, and Pseudomonadota (formerly pro-

teobacteria). These microorganisms produce adhesive compounds that cement sand and other rocky materials to form mineral "microbial mats". In turn, these mats build up layer by layer, growing gradually over time. This process generates the characteristic lamination of stromatolites, a feature that is hard to interpret, in terms of its temporal and environmental significance. Different styles of stromatolite lamination have been described, which can be studied through microscopic and mathematical methods. A stromatolite may grow to a meter or more. Fossilized stromatolites provide important records of some of the most ancient life. As of the Holocene, living forms are rare. <https://en.wikipedia.org/wiki/Stromatolite>.



[Stromatolite | Fossilized, Microbial Mats | Britannica](#)

ΕΝΔΙΑΦΕΡΟΝΤΑ - ΠΕΡΙΒΑΛΛΟΝ

Gravitricity weighs up one of Europe's deepest mines

Scotland's Gravitricity is set to deploy its underground energy storage technology at Pyhäsalmi Mine in central Finland, Europe's deepest zinc and copper mine.



The Pyhäsalmi mine tower in winter - Gravitricity

Located about 450km north of the Finnish capital Helsinki, the Pyhäsalmi Mine extends 1,444m below the Earth. With mine operations at Pyhäsalmi winding down, the local community set up a development company to explore redevelopment projects around the mine's infrastructure, including energy storage.

Gravitricity is set to deploy its GraviStore energy storage technology in a 530m deep auxiliary shaft. GraviStore can utilise off-peak electricity by raising heavy weights in the mine shaft, releasing the energy back on to the grid during high demand by lowering the weights. It's claimed the 2MW scheme at Pyhäsalmi will provide grid balancing services to the Finnish network.

"This project will demonstrate at full scale how our technology can offer reliable long life energy storage that can capture and store energy during periods of low demand and release it rapidly when required," said Martin Wright, Gravitricity executive chairman.

"This full-scale project will provide a pathway to other commercial projects and allow our solution to be embedded into mine decommissioning activities, offering a potential future for mines approaching the end of their original service life.

"It will also provide vital new low carbon jobs in an area which has suffered significantly from the end of traditional mining operations."

Mining ended at Pyhäsalmi in August 2022. The mine was the area's biggest employer and its closure led to a loss of over 600 direct and indirect jobs. Alongside the GraviStore project, the local development company - Callio Pyhäjärvi - is also exploring several other initiatives at the mine, including solar farms, technology startups, mining technology testing facilities and an underground 5G network.

"We can take advantage of the best of the region's electricity grid and transformation of the energy market," said Callio Pyhäjärvi's CEO, Henrik Kiviniemi. "It is also very attractive to take advantage of these opportunities for energy-intensive

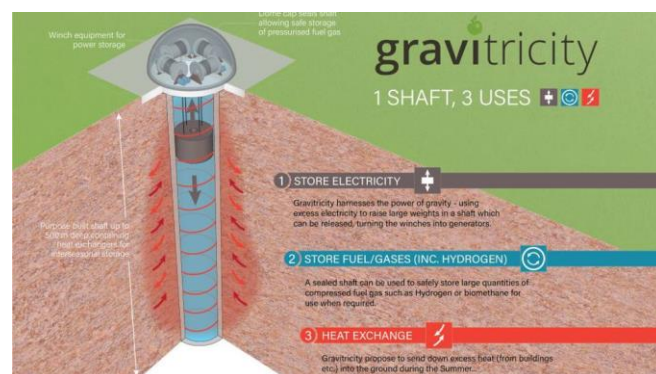
industry to be located here utilising also the good logistical location of Pyhäjärvi.

"Our industrial park can provide an excellent framework for electricity-intensive operators in the future, like Gravitricity, who can utilise the infrastructure and local know-how coming vacant from mining operations."

(THE ENGINEER, 05 Feb 2024, <https://www.theengineer.co.uk/content/news/gravitricity-weighs-up-one-of-europe-s-deepest-mines>)

Gravitricity and Arup look underground for hydrogen storage

Gravitricity and Arup have secured £300,000 in government funding to study the feasibility of storing hydrogen in purpose-built underground shafts.



Gravitricity

Edinburgh-based Gravitricity and Arup will collaborate on delivering a complete system design and commercial feasibility report for the idea, as well as identifying a potential site for their underground hydrogen store. The design will also include integration with gravity energy storage and inter-seasonal heat.

Gravitricity and Arup have been awarded £299,985 in Phase 1 of the Department of Business Energy & Industrial Strategy (BEIS) Low Carbon Hydrogen Supply 2 [HySupply 2] Competition.

If successful, the project could be selected to enter Phase 2, where the partners would build a scale demonstrator in the UK. This would involve sinking a concrete lined vertical underground shaft with a domed cap to create a demonstration pressurised hydrogen storage vessel.

In a statement, Sally Molyneux, Gravitricity's hydrogen and thermal storage lead, said: "If green hydrogen is to become a mass market fuel of the future – for example for providing heat to industry or powering heavy vehicles – then we need to find ways to store it safely and in large quantities close to where it is needed.

"Storing hydrogen in underground shafts is intrinsically safer and less obtrusive than above ground options and is a solution that does not require unique geology such as salt caverns. We believe Gravitricity's innovation is a scalable storage method which is cost effective, extremely durable, and can be implemented everywhere."

Longer term, the partners believe the shafts can also be used for fast response electricity storage, using Gravitricity's solid weight technology which raises and lowers heavy weights in a shaft.

In addition, the shaft's gastight lining will in future incorporate heat exchangers for inter-seasonal heat storage. Adding heat exchangers to the shaft lining would create a very large ground source capable of feeding a network of heat pumps in the surrounding area.

Last summer Gravitricity commissioned and operated a grid-connected 250kW demonstrator in Leith, Edinburgh, and now plan to build a full-scale project in a decommissioned mine shaft in mainland Europe.

(THE ENGINEERS, 23 May 2022, <https://www.theengineer.co.uk/content/news/gravitricity-and-arup-look-under-ground-for-hydrogen-storage-1>)

ΕΝΔΙΑΦΕΡΟΝΤΑ - ΛΟΙΠΑ

Ο ChatGPT λέει ό,τι λέει, αλλά... έχει και το «Γνώθι σαυτόν»!

Μας έχει «ζαλίσει» τον τελευταίο καιρό η «**Τεχνητή Νοημοσύνη**» (**TN**) (αγγλικά: **Artificial Intelligence, AI**), τόσο, που δίνεται η εντύπωση ότι έχει γίνει μόδα και χρησιμοποιείται πια ο όρος για λόγους εντυπωσιασμού (π.χ. διαφημιστικούς) είτε πρόκειται για τη σωστή έννοια είτε όχι (κάτι σαν το «DNA», που... κυκλοφορεί ευρέως τα τελευταία χρόνια...).

Εδώ θα ασχοληθούμε για λίγο με το συγκεκριμένο λογισμικό της εταιρείας OpenAI με το όνομα **ChatGPT** που – ως κύριο όνομα – παραμένει **ChatGPT** και στα ελληνικά. Στη σελίδα 4 του παρόντος φύλλου (στη Γωνιά του ΓΕΣΥ) έχουμε αντιμετωπίσει και το προσηγορικό **chat GPT** (με πεζό αρχικό **c**) που είναι συντομομορφή η οποία αποδίδει το πλησιέστερο γένος της έννοιας για το οποίο το ΓΕΣΥ έχει υιοθετήσει την ισοδυναμία όρων:

chat generative pretrained transformer, chat GPT ⇔ συνομιλιακός γενετικός προκαταρτισμένος μετασχηματιστής, συνομιλιακός GPT, GPT συνομιλίας

Ο **ChatGPT** λοιπόν είναι ένας **chat GPT** (δηλαδή ένας **συνομιλιακός γενετικός προκαταρτισμένος μετασχηματιστής** της εταιρείας OpenAI. Είναι ένα λογισμικό που βασίζεται στην **TN** και μπορεί κανένας να «συνομιλεί» μαζί του και να του θέτει διάφορα ερωτήματα, στα οποία απαντά με καταπληκτική ταχύτητα. Η κύρια γλώσσα του είναι τα αγγλικά, αλλά δέχεται ερωτήσεις και απαντάει και σε άλλες γλώσσες. Στα ελληνικά όχι ακόμα τόσο καλά.

Ας του κάνουμε, λοιπόν, μια πρώτη ερώτηση. Να μας δώσει έναν σύντομο και περιεκτικό ορισμό της **Τεχνητής Νοημοσύνης (TN)**.

Ep. Can you give me a concise definition of the concept "Artificial Intelligence" ?

An. Certainly! Artificial Intelligence (AI) refers to the development of computer systems that can perform tasks that typically require human intelligence. These tasks include learning, reasoning, problem-solving, perception, language understanding, and decision-making. AI aims to create machines that can simulate human cognitive functions and potentially exhibit capabilities such as self-learning and adaptation.

Δύο πρόσφατοι ορισμοί του Διεθνούς Οργανισμού Τυποποίησης (ISO) και της Διεθνούς Ηλεκτροτεχνικής Επιτροπής (IEC), για την **TN**, είναι, ως κλάδος:

artificial intelligence, AI

discipline concerned with the building of computer systems that perform tasks requiring intelligence when performed by humans
ISO/IEC 39794-16:2021(en), 3.6

και ως ικανότητα συστήματος:

artificial intelligence, AI

capability of an engineered system to acquire, process and apply knowledge and skills
ISO/IEC TR 29119-11:2020(en), 3.1.13

Όστε, με τον όρο **Τεχνητή Νοημοσύνη (TN)** αποδίδονται δύο έννοιες: αφενός ο τομέας της επιστήμης που μελετά και

ασχολείται με την κατασκευή συστημάτων υπολογιστών που επιτελούν έργα τα οποία απαιτούν νοημοσύνη όταν εκτελούνται από ανθρώπους και αφετέρου η ικανότητα ενός κατασκευασμένου συστήματος να αποκτά, να επεξεργάζεται και να εφαρμόζει γνώσεις και δεξιότητες.

Στον ορισμό που έδωσε ο **ChatGPT** εμπλέκονται και οι δύο έννοιες: αφενός αναλύεται περισσότερο η **TN** ως ικανότητα συστήματος: *μάθηση, λογική, επίλυση προβλημάτων, αντίληψη, κατανόηση της γλώσσας και λήψη αποφάσεων* και αφετέρου η **TN** ως κλάδος αποσκοπεί στη δημιουργία μηχανών που μπορούν να προσομοιώνουν ανθρώπινες γνωσιακές λειτουργίες και δυνητικά να εμφανίζουν ικανότητες όπως *αυτομάθηση και προσαρμογή*. Ας του κάνουμε άλλη μία ερώτηση.

Ep. Give me, please, a concise definition of the concept "Generative Pretrained Transformer (GPT)" !

An. Certainly! The Generative Pretrained Transformer (GPT) is a type of artificial intelligence language model that belongs to the transformer architecture. It is "pre-trained" by exposing it to a vast amount of diverse data, allowing it to learn the patterns and structures of language. The term "generative" indicates its ability to generate coherent and contextually relevant text based on the input it receives. GPT has been widely used for various natural language processing tasks, including text completion, summarization, translation, and question-answering.

Ένα «γλωσσικό μοντέλο» είναι, λοιπόν, ο **GPT**, που το έχουν προ-καταρτίσει εφοδιάζοντάς το με έναν τεράστιο όγκο δεδομένων και διδάσκοντάς το όλες τις δομές και τις σχηματομορφές της γλώσσας, το οποίο μπορεί να παράγει κείμενο με συνοχή και συγκεκριμένη συνάφεια (αναλύει και προσαρμόζεται στο συγκεκριμένο). Όσο για τον **chat GPT**, αυτός είναι «εξειδικευμένος» για συνομιλία. Και τώρα μια σοβαρή συνομιλία με τον **ChatGPT**:

Ep. While an answer of machine translation needs post-editing by a human translator in order to be verified or validated, what is needed by an answer of yours for such a verification or validation?

An. Validating or verifying the accuracy of an answer generated by a machine like mine (GPT-3) typically involves a similar process to post-editing machine translation, but with some key differences. **Here's what you would typically need to do to verify or validate an answer generated by me:**

Contextual Understanding: Ensure that the answer accurately reflects the context and intent of the question. This might involve assessing whether the response directly addresses the query and provides relevant information

Fact-Checking: Verify the factual accuracy of the information provided in the answer. Cross-reference the content with reliable sources to confirm its correctness.

Coherence and Consistency: Assess the overall coherence and logical flow of the response. Ensure that the answer makes sense and does not contradict itself within the provided text.

Relevance: Check if the response is relevant to the topic and question at hand. Irrelevant or off-topic information should be flagged.

Tone and Style: Ensure that the answer aligns with the desired tone, style, or level of formality. Adapt the response if necessary to match the intended audience or purpose.

Ethical Considerations: Evaluate the response for any

ethical concerns, such as biased or inappropriate content. Correct or filter out any content that may be offensive or harmful.

Language Quality: Check for proper grammar, spelling, and syntax. Fix any linguistic errors that may be present in the response.

Source Attribution: If the answer includes information from specific sources, ensure that proper attribution is provided, and citations are accurate.

Contextual Completion: Ensure that the response doesn't end abruptly and provides a well-rounded answer to the question.

Feedback Loop: Provide feedback on the response to the AI model. This feedback can help improve the quality of future responses by fine-tuning the model's training data.

It's important to note that while machine-generated responses can be valuable starting points, they often require human oversight and verification, especially for critical or complex tasks. The level of scrutiny and validation needed may vary depending on the specific application and the importance of the information being conveyed.

Ερ. Μπορείς να μου πεις τα παραπάνω στα ελληνικά;

Απ. Φυσικά! Για να επαληθεύσετε ή να επικυρώσετε την ακρίβεια μιας απάντησης που δημιουργήθηκε από ένα μηχανήμα όπως το δικό μου (GPT-3), τυπικά χρειάζεστε ένα παρόμοιο διαδικασία¹ με τη μετά-επεξεργασία μηχανικής μετάφρασης, αλλά με ορισμένες βασικές διαφορές. Εδώ είναι τι θα πρέπει να κάνετε τυπικά για να επαληθεύσετε ή να επικυρώσετε μια απάντηση που δημιουργήθηκε από μένα:

Κατανόηση του Συμφωνικού Πλαισίου: Βεβαιωθείτε ότι η απάντηση αντανακλά με ακρίβεια το πλαίσιο και την πρόθεση της ερώτησης. Αυτό μπορεί να περιλαμβάνει την αξιολόγηση εάν η απάντηση αντιμετωπίζει άμεσα το ερώτημα και παρέχει σχετικές πληροφορίες.

Έλεγχος των Στοιχείων: Επαληθεύστε την γνησιότητα των πληροφοριών που παρέχονται στην απάντηση. Συγκρίνετε το περιεχόμενο με αξιόπιστες πηγές για να επιβεβαιώσετε την ορθότητά του.

Συνέπεια και Συνάφεια: Αξιολογήστε τη συνολική συνέπεια και την λογική ροή της απάντησης. Βεβαιωθείτε ότι η απάντηση είναι συνεκτική και δεν αντικρούει τον εαυτό της εντός του παρεχόμενου κειμένου.

Σχετικότητα: Ελέγξτε αν η απάντηση είναι σχετική με το θέμα και το ερώτημα. Πρέπει να αναφέρετε τυχόν άσχετες ή εκτός θέματος πληροφορίες.

Υφή και Στυλ: Βεβαιωθείτε ότι η απάντηση συμμορφώνεται με τον επιθυμητό τόνο, στυλ ή επίπεδο τυπικότητας. Προσαρμόστε την απάντηση εάν απαιτείται για να ταιριάζει με το αναμενόμενο κοινό ή σκοπό.

Ηθικές Σκέψεις: Αξιολογήστε την απάντηση για ενδεχόμενες ηθικές ανησυχίες, όπως προκαταλήψεις ή ακατάλληλο περιεχόμενο. Διορθώστε ή αποκόψτε οποιοδήποτε περιεχόμενο που ενδέχεται να είναι προσβλητικό ή επιβλαβές.

Ποιότητα της Γλώσσας: Ελέγξτε τη σωστή γραμματική, ορθογραφία και σύνταξη. Διορθώστε οποιαδήποτε γλωσσικά λάθη που ενδέχεται να υπάρχουν στην απάντηση.

Αναφορά στην Πηγή: Εάν η απάντηση περιλαμβάνει πληροφορίες από συγκεκριμένες πηγές, βεβαιωθείτε ότι παρέχεται η κατάλληλη αναφορά και οι παραπομπές είναι ακριβείς.

Συμπληρωματικότητα στο Συμφωνικό Πλαίσιο: Βεβαιωθείτε ότι η απάντηση δεν τελειώνει απότομα και παρέχει μια ολοκληρωμένη απάντηση στο ερώτημα.

Κύκλος Ανατροφοδότησης: Παρέχετε ανατροφοδότηση στο μοντέλο της τεχνητής νοημοσύνης σχετικά με την απάντηση. Αυτή η ανατροφοδότηση μπορεί να βοηθήσει στη βελτίωση της ποιότητας των μελλοντικών απαντήσεων με την ρύθμιση των δεδομένων εκπαίδευσης του μοντέλου.

Είναι σημαντικό να σημειώσετε ότι, ενώ οι απαντήσεις που δημιουργούνται από μηχανές μπορούν να αποτελούν πολύτιμα αφετηρία, συχνά απαιτούν ανθρώπινη επίβλεψη και επαλήθευση, ιδιαίτερα για κρίσιμες ή πολύπλοκες εργασίες. Ο βαθμός επίβλεψης και επαλήθευσης που απαιτείται μπορεί να διαφέρει ανάλογα με τη συγκεκριμένη εφαρμογή και τη σημασία των παρεχόμενων πληροφοριών.

Ερ. "ένα παρόμοιο διαδικασία" > "μία παρόμοια διαδικασία"
"μετά-επεξεργασία" > "μετεπιμέλεια"
"Συμφωνικού Πλαισίου" > "Συγκείμενου"
"αντανακλά με ακρίβεια το πλαίσιο και την πρόθεση" > "ανταποκρίνεται με ακρίβεια στο συγκεκριμένο και στην πρόθεση"
"αντικρούει" > "αντιφάσκει"
"Υφή και Στυλ" > "Τόνος και ύφος"
"Συμπληρωματικότητα στο Συμφωνικό Πλαίσιο" > "Συγκειμενική πληρότητα"
"πολύτιμα αφετηρία" > "πολύτιμη αφετηρία"

Απ. Ορθογραφικές και γραμματικές διορθώσεις που προτείνετε είναι σωστές. Εδώ είναι η διορθωμένη έκδοση του κειμένου:

1. "μία παρόμοια διαδικασία"
2. "μετεπιμέλεια"
3. "Συγκείμενου"
4. "ανταποκρίνεται με ακρίβεια στο συγκεκριμένο και στην πρόθεση"
5. "αντιφάσκει"
6. "Τόνος και ύφος"
7. "Συγκειμενική πληρότητα"
8. "πολύτιμη αφετηρία"

Ευχαριστώ για τις διορθώσεις!

¹ Με **κίτρινο** χρώμα επισημαίνονται λέξεις ή φράσεις που είναι γλωσσικές «αστοχίες» στην ελληνική απάντηση του ChatGPT, ενώ με **πικραύλο** χρώμα επισημαίνονται κάποια σημεία για να τονιστούν.

Μερικά συμπεράσματα από αυτή τη συνομιλία.

Ο ChatGPT:

1. Απαντάει ταχύτατα και άπταιστα στη... μητρική του γλώσσα (τα αγγλικά). Στα ελληνικά: όχι άπταιστα, αλλά επιδέχεται διορθώσεις και μάλιστα... ευχαριστεί γι' αυτές!
2. Έχει υποστεί ειδική προκατάρτιση με έναν τεράστιο όγκο γλωσσικών δεδομένων, ώστε να μπορεί να αναλύει και να συνδυάζει συγκειμενικές πληροφορίες και να παράγει κείμενα απαντήσεων σε πληθώρα μη προσχεδιασμένων ερωτήσεων.

3. Αξιολογώντας ο ίδιος την αλήθεια και εγκυρότητα των απαντήσεών του, απαριθμεί 9 ενέργειες που πρέπει να κάνει ο χρήστης-συνομιλητής του για να επαληθεύσει ή να επικυρώσει την ακρίβεια των απαντήσεών του.
4. Στο τέλος, τονίζει ότι «ενώ οι απαντήσεις που δημιουργούνται από μηχανές μπορούν να αποτελούν πολύτιμη αφετηρία, συχνά απαιτούν ανθρώπινη επίβλεψη και επαλήθευση, ιδιαίτερα για κρίσιμες ή πολύπλοκες εργασίες...».

Όπως φαίνεται από τις απαντήσεις που μας έδωσε, ο **ChatGPT** έχει το «Γνώθι σαυτόν»! Και, αφού ρητά μας το λέει αυτός, εμείς καλό είναι να τον πιστέψουμε και να μην «παίρνουμε τοις μετρητοίς» τις απαντήσεις του, αλλά να τις ελέγχουμε όπως το προτείνει ο ίδιος. Προσωπικά, στο 4. θα παρέλεια το «συχνά»...

K.B.

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Principles of Chaos Engineering

Chaos Engineering is the discipline of experimenting on a system in order to build confidence in the system's capability to withstand turbulent conditions in production.

Advances in large-scale, distributed software systems are changing the game for software engineering. As an industry, we are quick to adopt practices that increase flexibility of development and velocity of deployment. An urgent question follows on the heels of these benefits: How much confidence we can have in the complex systems that we put into production?

Even when all of the individual services in a distributed system are functioning properly, the interactions between those services can cause unpredictable outcomes. Unpredictable outcomes, compounded by rare but disruptive real-world events that affect production environments, make these distributed systems inherently chaotic.

We need to identify weaknesses before they manifest in system-wide, aberrant behaviors. Systemic weaknesses could take the form of: improper fallback settings when a service is unavailable; retry storms from improperly tuned timeouts; outages when a downstream dependency receives too much traffic; cascading failures when a single point of failure crashes; etc. We must address the most significant weaknesses proactively, before they affect our customers in production. We need a way to manage the chaos inherent in these systems, take advantage of increasing flexibility and velocity, and have confidence in our production deployments despite the complexity that they represent.

An empirical, systems-based approach addresses the chaos in distributed systems at scale and builds confidence in the ability of those systems to withstand realistic conditions. We learn about the behavior of a distributed system by observing it during a controlled experiment. We call this *Chaos Engineering*.

CHAOS IN PRACTICE

To specifically address the uncertainty of distributed systems at scale, Chaos Engineering can be thought of as the facilitation of experiments to uncover systemic weaknesses. These experiments follow four steps:

1. Start by defining 'steady state' as some measurable output of a system that indicates normal behavior.
2. Hypothesize that this steady state will continue in both the control group and the experimental group.
3. Introduce variables that reflect real world events like servers that crash, hard drives that malfunction, network connections that are severed, etc.
4. Try to disprove the hypothesis by looking for a difference in steady state between the control group and the experimental group.

The harder it is to disrupt the steady state, the more confidence we have in the behavior of the system. If a weakness is uncovered, we now have a target for improvement before that behavior manifests in the system at large.

ADVANCED PRINCIPLES

The following principles describe an ideal application of Chaos Engineering, applied to the processes of experimentation described above. The degree to which these principles are pursued strongly correlates to the confidence we can have in a distributed system at scale.

Build a Hypothesis around Steady State Behavior

Focus on the measurable output of a system, rather than internal attributes of the system. Measurements of that output over a short period of time constitute a proxy for the system's steady state. The overall system's throughput, error rates, latency percentiles, etc. could all be metrics of interest representing steady state behavior. By focusing on systemic behavior patterns during experiments, Chaos verifies that the system does work, rather than trying to validate how it works.

Vary Real-world Events

Chaos variables reflect real-world events. Prioritize events either by potential impact or estimated frequency. Consider events that correspond to hardware failures like servers dying, software failures like malformed responses, and non-failure events like a spike in traffic or a scaling event. Any event capable of disrupting steady state is a potential variable in a Chaos experiment.

Run Experiments in Production

Systems behave differently depending on environment and traffic patterns. Since the behavior of utilization can change at any time, sampling real traffic is the only way to reliably capture the request path. To guarantee both authenticity of the way in which the system is exercised and relevance to the current deployed system, Chaos strongly prefers to experiment directly on production traffic.

Automate Experiments to Run Continuously

Running experiments manually is labor-intensive and ultimately unsustainable. Automate experiments and run them continuously. Chaos Engineering builds automation into the system to drive both orchestration and analysis.

Minimize Blast Radius

Experimenting in production has the potential to cause unnecessary customer pain. While there must be an allowance

for some short-term negative impact, it is the responsibility and obligation of the Chaos Engineer to ensure the fallout from experiments are minimized and contained.

Chaos Engineering is a powerful practice that is already changing how software is designed and engineered at some of the largest-scale operations in the world. Where other practices address velocity and flexibility, Chaos specifically tackles systemic uncertainty in these distributed systems. The Principles of Chaos provide confidence to innovate quickly at massive scales and give customers the high quality experiences they deserve.

Join the ongoing discussion of the Principles of Chaos and their application in the [Chaos Community](https://principlesofchaos.org/).

Last Update: 2019 March (<https://principlesofchaos.org/>)



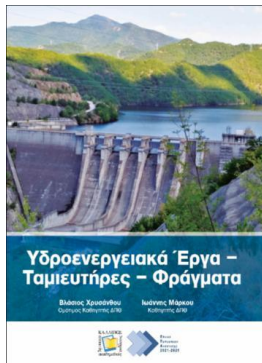
New Bridge collapse at the Dawan section of the Enguang Expressway in China



ΝΕΕΣ ΕΚΔΟΣΕΙΣ ΣΤΙΣ ΓΕΩΤΕΧΝΙΚΕΣ ΕΠΙΣΤΗΜΕΣ

νο του υδραυλικού πλήγματος, το σπειροειδές κέλυφος, τον υδροστρόβιλο και τον αγωγό εξόδου του υδροστρόβιλου.

(Κάλλιπος, Ανοικτές Ακαδημαϊκές Εκδόσεις.
<https://dx.doi.org/10.57713/kallipos-373>)



Υδροενεργειακά Έργα - Ταμιευτήρες - Φράγματα

**Χρυσάνθου, Βλάσιος
Μάρκου, Ιωάννης**

Ένα έργο παραγωγής υδροηλεκτρικής ενέργειας είναι αρκετά σύνθετο, αποτελούμενο κυρίως από τις κάτωθι συνιστώσες: ταμιευτήρας, φράγμα, ειδικές διατάξεις υδροενεργειακών έργων.

Οι ταμιευτήρες αποτελούν το πρώτο κεφάλαιο του παρόντος συγγράμματος. Δίνεται έμφαση στη διαστασιολόγηση τόσο ενός ταμιευτήρα ανάσχεσης πλημμύρας όσο και ενός ταμιευτήρα αποθήκευσης. Η διαστασιολόγηση αναφέρεται τόσο στη χωρητικότητα του ταμιευτήρα όσο και στις διατάξεις ασφάλειας του αντίστοιχου φράγματος, ήτοι στον εκχειλιστή ασφάλειας και στον εκκενωτή πυθμένα. Επίσης, αναφέρονται μέθοδοι βελτιστοποίησης, συγκεκριμένα αναλυτικές μέθοδοι, οι οποίες περιλαμβάνουν τον γραμμικό και τον δυναμικό προγραμματισμό, και μέθοδοι προσομοίωσης. Η βελτιστοποίηση αφορά τη μεγιστοποίηση του οικονομικού κέρδους από τη διάθεση του νερού στους χρήστες ή την ελαχιστοποίηση των υλικών ζημιών από πλημμύρες. Πέραν τούτων, δίνονται μέθοδοι εκτίμησης της εξάτμισης από τους ταμιευτήρες, της θερμικής στρωμάτωσης και της ποιότητας του νερού των ταμιευτήρων. Τέλος, εξετάζεται το πρόβλημα της συσσώρευσης φερτών υλών σε ταμιευτήρες και παρουσιάζονται τρόποι αντιμετώπισής του.

Το δεύτερο κεφάλαιο του παρόντος συγγράμματος αναφέρεται στον σχεδιασμό και στην κατασκευή χωμάτων και λιθόρριπτων φραγμάτων. Ειδικότερα, γίνεται αναφορά στην απαιτούμενη γεωτεχνική έρευνα και στα κατάλληλα υλικά κατασκευής τους. Περιγράφονται τα απαραίτητα (ή εναλλακτικά) μέτρα για τη βελτίωση του σχηματισμού θεμελίωσης. Καλύπτονται θέματα σχετικά με τον σχεδιασμό και την κατασκευή φίλτρων και στραγγιστηρίων, καθώς και τη ροή νερού διαμέσου χωμάτων φραγμάτων. Στο σημείο αυτό γίνεται αναφορά στον έλεγχο της ευστάθειας των φραγμάτων και στα διαφράγματα στεγανοποίησης από οπλισμένο σκυρόδεμα και ασφαλικό σκυρόδεμα. Το συγκεκριμένο κεφάλαιο κλείνει με την ενόργανη παρακολούθηση της συμπεριφοράς των χωμάτων και λιθόρριπτων φραγμάτων.

Το τρίτο κεφάλαιο του παρόντος συγγράμματος αναφέρεται στα φράγματα σκυροδέματος. Απαριθμούνται οι δυνάμεις που ενεργούν στα φράγματα σκυροδέματος, με τους αντίστοιχους τύπους. Ακολουθεί ο στατικός υπολογισμός των φραγμάτων βαρύτητας, των τοξωτών φραγμάτων, καθώς και των αντηριδωτών φραγμάτων. Τέλος, μελετώνται οι εκχειλιστές ασφάλειας των φραγμάτων, καθώς και οι λεκάνες ηρεμίας καπάντη των φραγμάτων, από κατασκευαστική και υδραυλική άποψη. Στο τέταρτο κεφάλαιο αναφέρονται, κατ' αρχάς, γενικότητες περί υδροενεργειακών εγκαταστάσεων. Οι μελετώμενες ειδικές διατάξεις των υδροενεργειακών έργων, με απώτερο σκοπό τη διαστασιολόγηση αυτών, περιλαμβάνουν τον πύργο ανάπαλσης, τον αγωγό πτώσης, όπου παρουσιάζεται το φαινόμε-

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On behalf of the organizing committee, I am pleased to announce that the 2024 Purdue Geotechnical Society Workshop and the 20th G.A. Leonards Lecture, an in-person event, will take place on Friday, Ap... [Read More](#)

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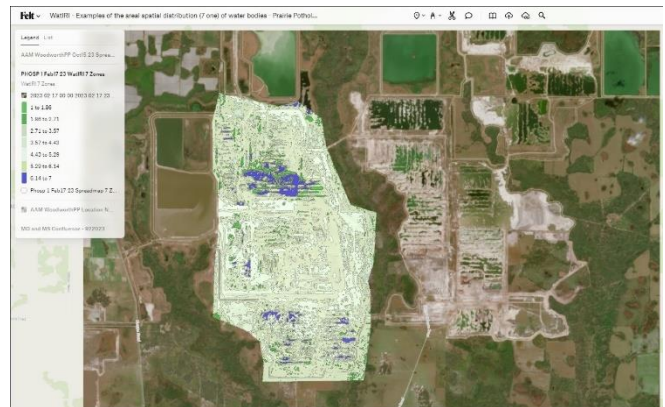
Seeking PhD Supervisors for Research Proposal on Climate-Resilient Geotechnical Infrastructure [Julien Babarinde Koudoro](#) news 20 Feb 2024

Seeking PhD Supervisors for Research Proposal on Climate-Resilient Geotechnical Infrastructure Dear GeoWorld Community, I am Julien Babarindé KOUDORO, an experienced civil engineer specializing... [Read More](#)

Cone Penetration Test (CPT) [Geoengineer.org](#) education 30 Jan 2024

Brand new education article on the CPT! This introduction to the CPT is part of the book "P. K. Robertson, K. Cabal, Guide To Cone Penetration Testing... [Read More](#)

Tailings and Impoundments Reflectance Index (TIRI) [John Steven Metzger](#) news 14 Jan 2024



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Potential \$37 billion rare earth mineral deposit found in Wyoming mine [Geoengineer.org](#) news 19 Dec 2023



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Different Types of Weathering [Akram Jaffar Jan](#) Erosion 19 Feb 2024

Weathering is the process by which rocks and minerals on the Earth's surface break down into smaller particles over time. There are two main types of weathering: mechanical (physical) weathering a... [Read More](#)

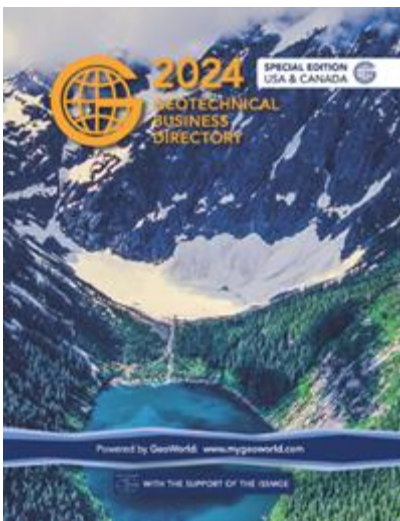
12th International Conference on Scour and Erosion (ICSE 12) - First Announcement [ISSMGE TC213](#) 26 Jan 2024

The First Announcement for the 12th International Conference on Scour and Erosion (ICSE-12) is now available [Read More](#)

3-module virtual short course series on Geotechnical Earthquake Engineering [Dimitrios Zekkos](#) news 08 Dec 2023

Six #UCBerkeley #Faculty (Jonathan Bray, Nicholas Sitar, Adda Athanasopoulos-Zekkos, Robert Kayen, Norman Abrahamson and yours truly) are teaching a 3-module virtual #short #course series on #Geotechn... [Read More](#)

Announcing the Publication of the 2024 USA & Canada Special Edition Geotechnical Business Directory [GeoWorld](#)



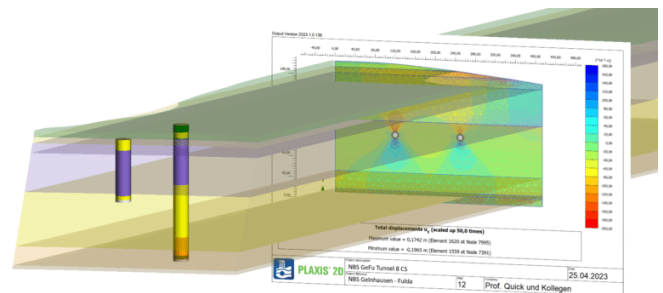
We have just published a special 2024 edition of the annual Geotechnical Business Directory series with the support of the International Society for Soil Mechanics and Geotechnical Engineering (ISSMGE). The special edition highlights members in the USA and Canada, showcasing... [Read More](#)

GeoWorld Mobile App Launched for Android & iOS [GeoWorld](#)



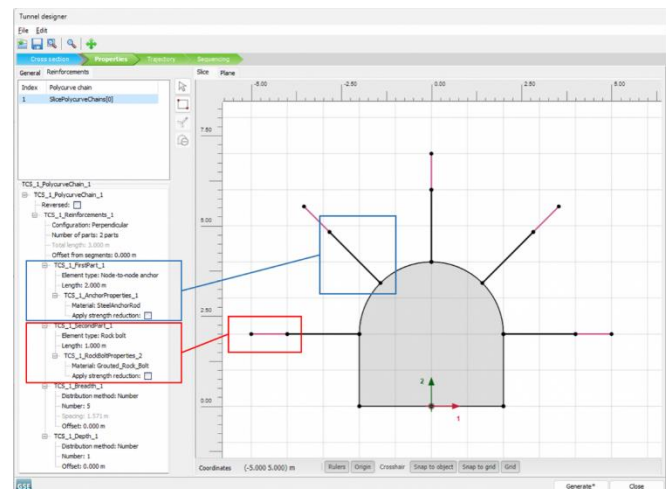
GeoWorld is delighted to introduce the release of its new mobile app, which is now accessible on both Android and iOS devices. This latest development allows GeoWorld members to interact with the network of 35,500+ geotechnical engineers and 1,100+ companies and organizations... [Read More](#)

BIM workflow for new German high-speed railway line [Seequent, The Bentley Subsurface Company](#) PLAXIS /Leapfrog 23 Feb 2024



Prof. Quick und Kollegen was commissioned by Deutsche Bahn Netz AG to determine an optimal rail route option and explore the geotechnical feasibility of tunnels while protecting the... [Read More](#)

PLAXIS 2024.1 New release is out! [Seequent, The Bentley Subsurface Company](#) PLAXIS 23 Feb 2024



With PLAXIS 2024.1 users benefit from enhancements for designing and reinforcing underground excavations, improvement in the connected geotechnical workflow and modal analysis for offshore f... [Read More](#)

Best Project Specialty Construction: Martin Marietta Texas Quarry Highwall Stabilization [GeoStabilization International](#) resource 23 Feb 2024



Photo courtesy GeoStabilization International This innovative project, by GeoStabilization International, required stabilizing two areas of a quarry that were experiencing frequent rockfall... [Read More](#)

Rocscience, Backed by TA, Expands Global Presence with DIANA FEA Acquisition [Rocscience](#) resource 23 Feb 2024



Rocscience Inc., a leading geotechnical software solutions provider, in collaboration with global private equity firm TA Associates (TA), proudly announces the acquisition of DIANA... [Read More](#)

ISSMGE Interactive Technical Talk Episode 14 [ISSMGE TC202](#) 20 Feb 2024

IITT Speakers - TC 202



Mike Winter
Winter Associates Limited
Visiting Professor Universities of Portsmouth and Shimane
Emeritus Chief Scientific Editor, QJEGH
TC202 – Transportation Geotechnics (Vice Chair)

Landslides, debris flow, hazard and risk assessment, management and mitigation, socio-economic and network impacts, engineering in glacial soils, soil compaction, soil acceptability for earthwork, waste geomaterials



Erol Tutumluer
Abel Bliss Professor, University of Illinois
Editor-in-Chief, Transportation Geotechnics
TC 202 – Transportation Geotechnics (Immediate Past Chair)

Wide experience in Transportation Geotechnics. Interests in characterization of highway / airfield pavements and railroad track geomaterials, geosynthetics, and computer vision, smart sensors and AI applied to building sustainable and connected transportation infrastructure



Chathuri Arachchige
Postdoctoral Research Associate
University of Technology Sydney

Alternative geo-materials, waste utilization, granular materials for infrastructure, Large-scale laboratory testing, field testing, Numerical modelling



Daniel Berro
Geotechnical Products Sales Engineer
Bentley Systems

Numerical Modelling, deep foundations, ground improvement, slope stability, transportation geotechnics

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Mine waste dam failure in Myanmar caught on video [Geoengineer.org](#) news 06 Feb 2024



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ISSMGE Interactive Technical Talk Episode 12: Physical Modelling in Geomechanics (TC104) [ISSMGE TC104](#) 12 Dec 2023

The twelfth episode of International Interactive Technical Talk has just been launched and is supported by TC194. Prof. Ioannis Anastasopoulos, Prof. Cristina Tsuha and Dr. Federico... [Read More](#)

FHWA initiatives on Sustainability [Anand Jagadeesh Puppala](#) news 21 Jan 2024

I want to post the following for FHWA (USA)'s initiatives on Sustainability and there are reports that may be available to download if you are working in this field - <https://www.fhwa.dot.gov/pav...> [Read More](#)

News and Information Circular - December 2023 [ISSMGE](#) 11 Dec 2023 [Read More](#)

4th webinar in the monthly webinar series "The future of Infrastructure today!" on Friday 1st of March [UC Berkeley Center for Smart Infrastructure](#) news 21 Feb 2024

LECTURE: ADVANCING SUSTAINABILITY IN THE GEOTECHNICAL INDUSTRY

Part of "The future of Infrastructure today!"
UC Berkeley CSI Webinar Series

MAIN SPEAKER **Kimberly Martin** PhD, PE, Senior Engineer – Innovation and Sustainability, Keller

Friday March 1, 2024
9:00-10:00am Pacific Standard Time

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Slide with recent major landslides events [Dimitrios Zekkos](#) news 08 Jan 2024

Landslides are responsible for significant damage to infrastructure, loss of life and loss of economic output



Giving a presentation tomorrow at Northwestern University, and thanks to [Geoengineer.org](#) was able to quickly put together the slide below with major landslides events that occurred very recently. Than... [Read More](#)

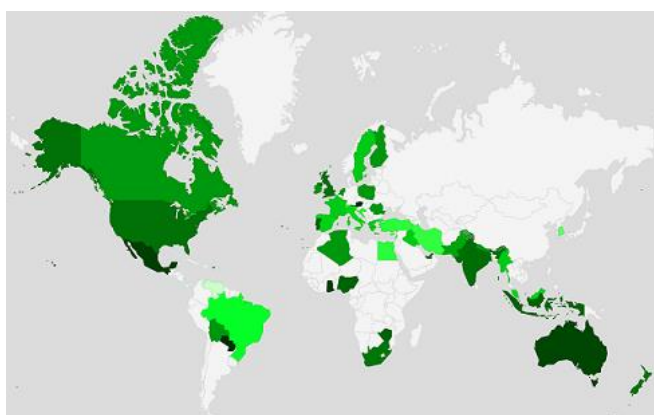
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Influence the Geotechnical Confidence Index Results for 2024 Q1! [GeoWorld](#)



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Lecture "Current and future challenges for computational geomechanics" Prof. Jidong Zhao



[ISSMGE TC103](#) 23 Jan 2024

On January 22, the TC103 supporting committee of JGS held the TC103 seminar in Kyoto. The Lecture entitled Current and

future challenges for computational geomechanics" was given by... [Read More](#)

Deep Excavation Online Course [Chang-Yu Ou](#) news 01 Feb 2024 [Read More](#)

In Memoriam: James K. Mitchell, Sc.D, P.E., NAE, NAS, Dist.M.ASCE [ISSMGE](#) 29 Dec 2023 [Read More](#)

SPTfoundation: Deterministic shallow foundation design using SPT data [DCodes](#) news 21 Feb 2024

DETERMINISTIC SHALLOW FOUNDATION DESIGN USING SPT DATA			
Variable 1			
SPT Correction Factor	1		
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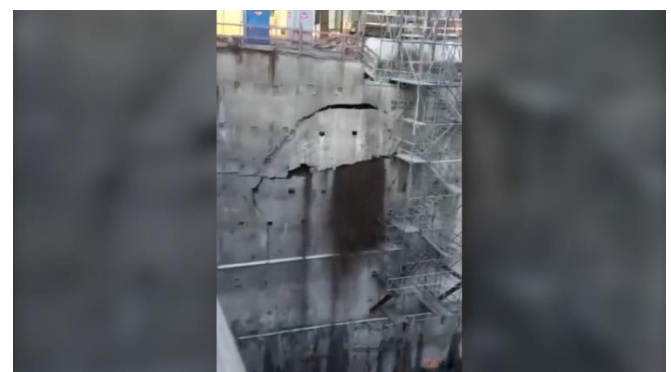
ISSMGE Interactive Technical Talk Episode 13: Laboratory Stress Strain Strength Testing of Geomaterials (TC101) [ISSMGE TC101](#) 12 Jan 2024

The thirteenth episode of International Interactive Technical Talk has just been launched and is supported by TC101. Prof. David Airey, Prof. Irene Rocchi, Dr. David Reid and Prof. A... [Read More](#)

PGS Workshop on Geotechnics of Dams [Philippe L Bourdeau](#) news 04 Jan 2024

PGS Workshop on Geotechnics of Dams and the 20th G.A. Leonards Lecture by Prof. Jonathan D. Bray, April 12, 2024... [Read More](#)

Video shows the moment soil nail wall collapses in Coquitlam, Canada [Geoengineer.org](#) news 02 Dec 2023



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12 Feb 2024 [Read More](#)



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Editorial

[Note of appreciation to paper reviewers](#), 31(1), pp. 1–2

Research Articles

[CFD-DEM modeling of filtration through conventional and conical geotextile filter systems](#), [S. C. Ryoo](#), [S. Erucar](#), [T. M. Evans](#), [A. H. Aydilek](#), 31(1), pp. 3–17

[Mechanical behaviour and stress-strain recovery characteristics of expanded polypropylene](#), [Z. Maqsood](#), [J. Koseki](#), [H. Kyokawa](#), 31(1), pp. 18–30

[Hydration behavior of geosynthetic clay liner with polymerized bentonite](#), [X. Zhu](#), [J. Chai](#), 31(1), pp. 31–41

[Effect of closed and open system freeze-thaw cycles on GMB-GCL interface transmissivity](#), [R. K. Rowe](#), [N. Martinez Noboa](#), [R. W. I. Brachman](#), 31(1), pp. 42–53

[Upper-bound limit analysis of MSE walls subjected to strip footing load](#), [P. Xu](#), [G. Yang](#), [K. Hatami](#), [T. Li](#), 31(1), pp. 54–66

[Experimental analysis of bearing capacity failure of geosynthetic-reinforced soil walls](#), [J. Derksen](#), [M. Ziegler](#), [R. Fuentes](#), 31(1), pp. 67–93

[Construction of geofabric block embankments atop existing transportation infrastructure](#), [A. T. Özer](#), [E. Akinay](#), 31(1), pp. 94–112



www.sciencedirect.com/journal/geotextiles-and-geomembranes/vol/51/issue/1

[Required strength of geosynthetic-reinforced soil structures subjected to varying water levels using numeric-based kinematic analysis](#), Z.L. Zhang, Z.W. Li, C.T. Hou, Q.J. Pan, Pages 1-15

[Numerical modeling of geosynthetic reinforced soil retaining walls with different toe restraint conditions](#), Wan Zhang, Jianfeng Chen, Pages 16-29

[Importance of thickness reduction and squeeze-out Std-OIT loss for HDPE geomembrane fusion seams](#), William Francey, R. Kerry Rowe, Pages 30-42

[Influence of geosynthetic stiffness on bearing capacity of strip footings seated on thin reinforced granular layers over undrained soft clay](#), Reza Jamshidi Chenari, Richard J. Bathurst, Pages 43-55

[Calculating local geomembrane strains from gravel particle indentations with thin plate theory](#), H.M.G. Eldesouky, R.W.I. Brachman, Pages 56-72

[Dynamic response of Mechanically Stabilised Earth \(MSE\) structures: A numerical study](#), Arman Kamalzadeh, Michael J. Pender, Pages 73-87

[Change pattern of geomembrane surface roughness for geotextile/textured geomembrane interfaces](#), Gaojie Xu, Jianyong Shi, Yan Li, Pages 88-99

[Estimation of seismic active earth pressure on reinforced retaining wall using lower bound limit analysis and modified pseudo-dynamic method](#), Koushik Halder, Debarghya Chakraborty, Pages 100-116

[Influence of uncertainty in geosynthetic stiffness on deterministic and probabilistic analyses using analytical solutions for three reinforced soil problems](#), Richard J. Bathurst, Fahimeh M. Naftchali, Pages 117-130

[Land reclamation using the horizontal drainage enhanced geotextile sheet method](#), Hao Chen, Jian Chu, Wei Guo, Shifan Wu, Pages 131-150

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[Evaluation of Atactic Polypropylene \(APP\) geomembranes used as liners for salt ponds](#), Sandarva M. Sharma, Kuo Tian, Burak Tanyu, Pages 165-178

[Artificial intelligence algorithms for predicting peak shear strength of clayey soil-geomembrane interfaces and experimental validation](#), Zhiming Chao, Danda Shi, Gary Fowmes, Xu Xu, ... Chuanxin Yang, Pages 179-198

[Effect of chemical additives on the consolidation behaviours of mini-PVD unit cells –from macro to micro](#), Rila Anda, Jinchun Chai, Takehito Negami, Pages 199-208

[Effect of pressurization frequency and duration on the consolidation of a dredged soil using air booster vacuum preloading combined with prefabricated horizontal drains](#), Jun Wang, Hongtao Fu, Weikai Zhang, Junfeng Ni, ... Ying Cai, Pages 209-218

[Effect of elevated temperatures on the degradation behaviour of elastomeric bituminous geomembranes](#), A. Samea, F.B. Abdelaal, Pages 219-232

[Experimental investigation on the accumulated strain of coarse-grained soil reinforced by geogrid under high-cycle cyclic loading](#), Kai Cui, Dongjie Zhang, Qiongli Li, Shangchuan Yang, Haodong Zhang, Pages 233-244

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[Analytical method for quantifying performance of wicking geosynthetic stabilized roadway](#), Wuyu Zhang, Xiongyu Tang, Xiaohui Sun, Ruochen Yang, ... Jun Guo, Pages 259-274

[A preliminary study of the application of the strain-self-sensing smart geogrid rib in expansive soils](#), Gang Bi, Shaohua Yang, You Wu, Yijie Sun, ... Suqian Cao, Pages 275-281

[Forecasting the moisture dynamics of a landfill capping system comprising different geosynthetics: A NARX neural network approach](#), S.M. Dassanayake, Ahmad Mousa, Gary J. Fowmes, S. Susilawati, K. Zamara, Pages 282-292

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