

# WORKSHOP on THE GEOTECHNICAL CHALLENGES POSED BY HIGH PLASTICITY CLAYS

**Date: 11 July 2022**

**Venue: Building ΚΟΔ 07 – Room 010  
University of Cyprus campus  
Nicosia, Cyprus**

**Under the auspices of the  
Cypriot Society of Soil Mechanics  
and Geotechnical Engineering (CSSMGE)**



High plasticity clays are encountered in many parts of the world, including the island of Cyprus. These clays are characterised by low friction angle values and a high tendency for volume change upon changes in their moisture content. As such, high plasticity clays are responsible for landslides and other instabilities even in mild terrain, and for damage to buildings and other infrastructure due to ground swelling and shrinkage, two problems that are of particular relevance to Cyprus. Moreover, under partial saturation they often exhibit a network of desiccation cracks that affect both the strength and the permeability of the soil in-situ. The aim of this workshop is to shed light on the complex phenomena governing the hydro-mechanical behavior of high plasticity clays and present ways of dealing with the pertinent geotechnical problems in practice.

**No registration is required.  
Attendance is free and open to anyone who is  
interested.**

**The workshop will be live streamed at:**

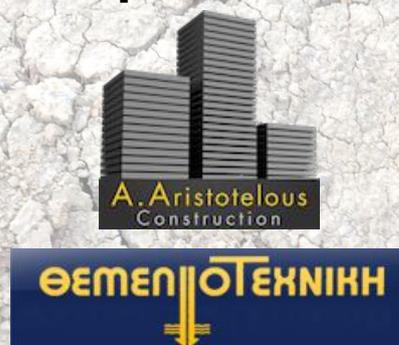
<https://ucy.cloud.panopto.eu/Panopto/Pages/Viewer.aspx?id=6d92f327-e42c-41c8-aebc-aeb700a1ef31>  
from 9:15 to 13:10

<https://ucy.cloud.panopto.eu/Panopto/Pages/Viewer.aspx?id=9eb9cbae-fd26-43f9-ae7c-aeb700a28351>  
from 13:50 to 16:30

## Organisers



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# WORKSHOP PROGRAMME

**9:15 Welcome address – Opening speeches**

- Dimitrios Loukidis, University of Cyprus
- Andreas Theodotou, Vice President of Cyprus Scientific and Technical Chamber (ETEK)
- Elena Sophocleous, President of Cypriot Society of Soil Mechanics and Geotechnical Engineering
- Michael Bardanis, President of Hellenic Society of Soil Mechanics and Geotechnical Engineering

**SESSION 1: Fundamentals of Hydro-Mechanical Behaviour of Clays**

**9:30 Hydro-mechanical behaviour of high-plasticity clays**

Enrique Romero Morales, Universitat Politècnica de Catalunya

**10:10 Suction and partial saturation in clays: fundamentals and measurement techniques**

Alessandro Tarantino, University of Strathclyde (via teleconferencing)

**10:50 *Coffee break***

**SESSION 2: Slope Stability and Landslides**

**11:10 The hydro-mechanics of high plasticity intensely fissured clays and its impact on slope stability**

Federica Cotecchia, Politecnico di Bari

**11:50 Soil-atmosphere interaction in unsaturated soils: stability and serviceability of engineered slopes and barriers**

Katerina Tsiambousi, Imperial College London

**12:30 Examples of mechanical properties and slope instabilities in expansive soils in Greece & Cyprus**

Michael Bardanis, EDAFOS Engineering Consultants S.A.

**13:10 *Lunch break***

**SESSION3: Expansive Clays of Cyprus**

**13:50 A Review of Experimental Research on Swell-Shrink Soils of Cyprus**

Huriye Bilsel, Cyprus International University

**14:30 Application of stabilizing techniques for swelling soils and foundations in Cyprus**

Panagiotis (Panicos) Papadopoulos, Frederick University

**15:10 The geotechnical challenges of Nicosia marl and possible mitigation approaches**

Dimitrios Loukidis, University of Cyprus

**16:00 Closing Remarks**

## Short bios of speakers

**Enrique Romero Morales** is Director of Research and Head of the Geotechnical Laboratory in the Department of Civil and Environmental Engineering at the Universitat Politècnica de Catalunya (Spain), and Full Research Professor in the Geomechanics Group at CIMNE (Spain). His research is mainly focused on multi-physics and multi-scale studies of geomaterials. He is the author or co-author of 300+ scientific papers, a member of editorial boards of several international journals, and co-editor of the books 'Advanced Experimental Unsaturated Soil Mechanics' (2005), 'Laboratory and Field Testing of Unsaturated Soils' (2009), and 'Advanced experimental techniques in geomechanics. ALERT Doctoral School' (2012). Among other awards, he has been '2<sup>nd</sup> European Distinguished Lecture on Unsaturated Soils' (2020). He co-chaired the '4<sup>th</sup> European Conference on Unsaturated Soils' held in Lisbon (Portugal) in October 2020. He has been elected (January 2022) chair of the TC 106 of Unsaturated Soils of the International Society for Soil Mechanics and Geotechnical Engineering.

**Alessandro Tarantino** is Professor of Experimental Geomechanics at the University of Strathclyde in Glasgow (Scotland) since 2010. His research is in the field of unsaturated soil mechanics, earth structures interacting with the atmosphere, and soil-plant-atmosphere interaction. He is an internationally renowned specialist in the measurement of high suction (water tension). He was keynote lecturer at the 3<sup>rd</sup>, 4<sup>th</sup>, and 5<sup>th</sup> International Conferences on Unsaturated Soils, 2<sup>nd</sup> and 3<sup>rd</sup> European Conferences on Unsaturated Soils and at the 3<sup>rd</sup> International Conference on 'Soil Bio- and Eco-Engineering: The Use of Vegetation to Improve Slope Stability'. He has coordinated major European consortium projects including TERRE 'Training Engineers and Researchers to Rethink Geotechnical Engineering for a low carbon future' and MAGIC 'Monitoring systems to Assess Geotechnical Infrastructure subjected to Climatic hazards'. He is member of the editorial board of Géotechnique, Geomechanics for Energy and the Environment, Acta Geotechnica, and Bulletin of Engineering Geology and the Environment. He has more than 150 publications in journal and conference proceedings.

**Federica Cotecchia** is Full Professor of Geotechnical Engineering at Politecnico di Bari. She has conducted experimental research, in the laboratory and the field, and endeavoured the development of theoretical frameworks of hydro-mechanical behaviour of soils and of geotechnical systems. Her work has conveyed knowledge about the influence of micro to meso structure on the behaviour of clays, under either full or partial saturation. She has developed research about the geo-hydro-mechanical modelling of complex natural deposits, the mechanics of slopes and landslides, the effects of geotechnical settlements on either ancient or modern structures, the response of contaminated marine sediment deposits. She has studied the processes generating different landslide mechanisms, implementing advanced soil mechanics in the assessment of landslide hazard at the site scale. She is currently doing research heading towards a framework of geo-hydro-mechanical characterization of landslide classes and on landslide risk sustainable mitigation. She is author of 176 papers published in international scientific journals, books and proceedings. She has been Chief Editor of Géotechnique Letters (2016-2019) and she is currently member of the Editorial Board of the Italian Geotechnical Journal. She has supervised 12 completed PhD dissertations and delivered more than 50 invited lectures, panel lectures, and keynote lectures in international scientific meetings.

**Katerina Tsiampousi** is a Senior Lecturer at Imperial College London, specialising in both experimental and numerical studies of unsaturated soils for applications on Energy and Environmental Geotechnics. Her recent work has focused on soil-atmosphere interaction and geological facilities for nuclear waste disposal. She has successfully led the development and use of bespoke experimental apparatus and techniques to study the THM behaviour of unsaturated soils. Her numerical achievements include the development of governing equations and of constitutive and hydraulic models for unsaturated soils, which she has applied to investigate the stability and serviceability of natural and engineered slopes. She is the Lead Investigator for Imperial College in the £1.65M EPSRC project CACTUS (EP/R005834/1) on Climate Adaptation Control Technologies for Urban Spaces and a Co-I in the Euratom project BEACON (EC 745942) on the mechanical behaviour of bentonite. She is a member of the Management Committee of the Centre for Nuclear Engineering and of the ISSMGE Technical Committee 106 Unsaturated Soils. She is a member of the Editorial Panel of Géotechnique and of Computers and Geotechnics.

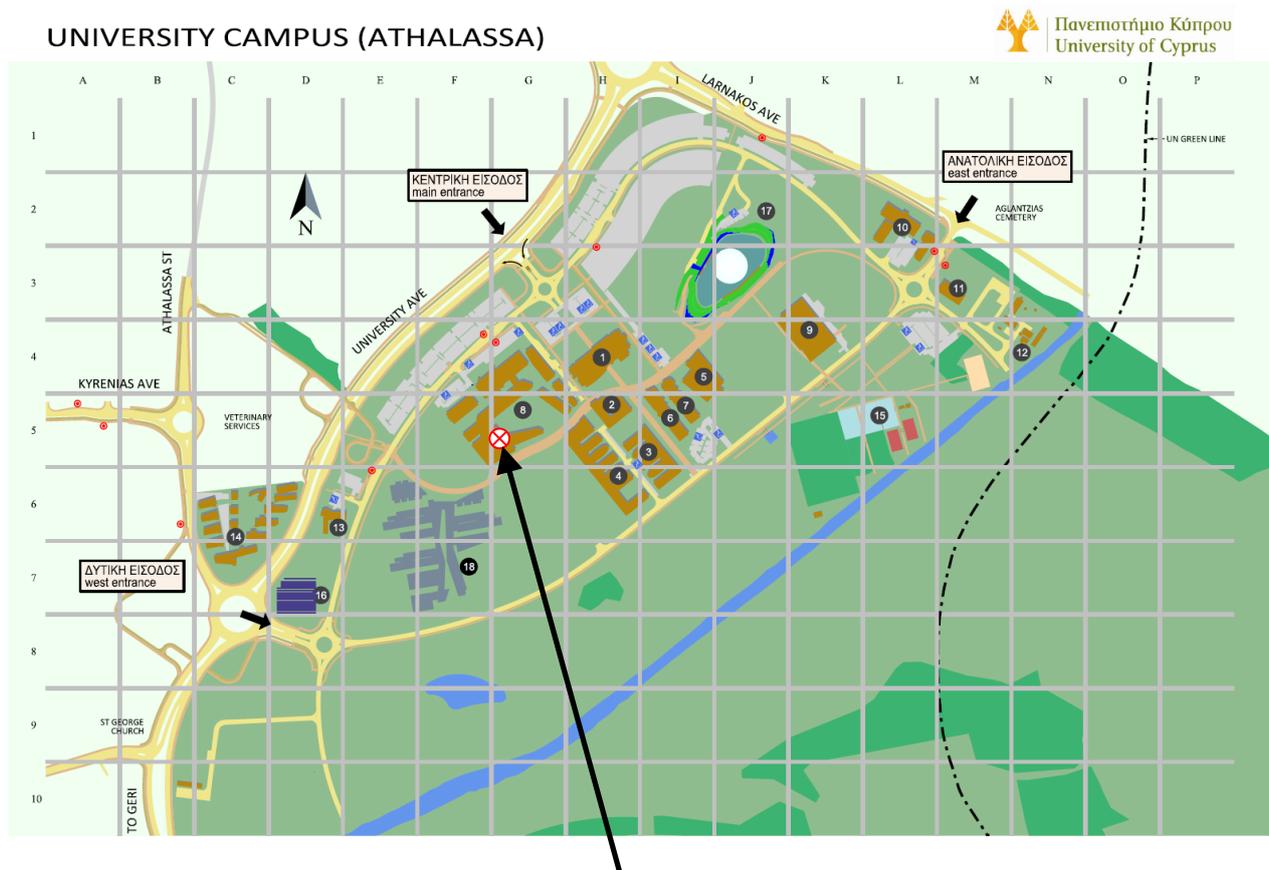
**Michael Bardanis** is the Director of Laboratory of EDAFOS Engineering Consultants S.A., a geotechnical consultancy based in Athens, Greece. He holds a Diploma in Civil Engineering from the National Technical University of Athens, an MSc in Soil Mechanics from Imperial College, London, and a PhD degree in Unsaturated Soil Mechanics from the National Technical University of Athens. Michael has worked as a geotechnical engineer since 1998 on several demanding projects in Greece, Cyprus and Bulgaria, including large landslide remediation projects, highways, dams and airports. Since 2009 he directs a large commercial soil and rock mechanics laboratory designed and organized by himself. Michael has authored and co-authored 70 papers in journals and conferences, mainly on unsaturated soil mechanics, landslides and the mechanical behaviour of soils. Since 2018 he is a visiting lecturer at Neapolis University Paphos, Cyprus, teaching Engineering Geology, Soil Mechanics, and Foundation Engineering. He has been elected several times on the Executive Committee of the Hellenic Society of Soil Mechanics and Geotechnical Engineering (HSSMGE), serving as its Secretary General between 2015 and 2019, and as its President since 2019. He is the Chairman of the 8<sup>th</sup> International Conference on Unsaturated Soils to be held on Milos island, Greece, in 2023.

**Huriye Bilsel** is a Professor of Geotechnical Engineering at Cyprus International University. Prior to that she worked for 34 years at the Eastern Mediterranean University. A graduate of Louisiana State University, she started her career in New Orleans as a project engineer in a soil investigation company. She has completed her PhD on the soils of Cyprus, during the process of programme developments, occasional administrative work, teaching of numerous civil engineering courses, and consultation works. Having encountered with problematic soils of Cyprus, she has concentrated her efforts on identifying and studying the engineering behaviour of expansive soils and liquefiable soils. Her main research concentration has been on characterization of swell-shrink behaviour of expansive soils on the island and mitigation using various materials, mainly industrial or natural waste by-products. Her recent research interest has been in biocementation of liquefiable sands of Cyprus using microbially induced calcium carbonate precipitation (MICP) and enzyme induced calcium carbonate precipitation (EICP) techniques, on which she has supervised two PhD theses. She has supervised more than 30 PhD and MSc students, and published more than 50 scientific articles.

**Panagiotis (Panicos) Papadopoulos** is Associate Professor of Civil Engineering at Frederick University. He studied at the University of Florida, where he obtained Bachelor's in civil engineering (BSCE), Master's in civil engineering (MSCE), and PhD degree with specialization in dynamic soil-structure interaction. As a consulting engineer, he has designed a large number of building projects, bridges, industrial facilities and foundations in Cyprus and abroad. He is 'co-inventor' of international applied patents on structures with tensioned membranes. He has served as Secretary General, Vice President and President of the Cyprus Association of Civil Engineers (1995-2001) and member of the General Council of the Scientific Technical Chamber of Cyprus (1999-2008). He has served in various technical committees as an invited member for purposes of providing expertise and submitting special reports, research projects, research platforms, inter-university programs etc. Represents Cyprus in the Commission of the TC250 for EUROCODE 7 and the Horizontal Group Bridges of the European Union. His research interests include soil-structure interaction, dynamic behaviour of structures and seismic isolation, foundations, bridge construction, industrial structures and silos, sustainable design and technology, strengthening of existing structures, and has authored relevant technical reports, publications and presentations in conferences and journals.

**Dimitrios Loukidis** is Associate Professor of Geotechnical Engineering in the Department of Civil & Environmental Engineering of the University of Cyprus. Upon completion of his undergraduate studies in Civil Engineering at the National Technical University of Athens (NTUA), he pursued graduate studies at Purdue University in the area of geotechnical engineering, where he received his Master's and PhD degrees. His main research interests focus on foundation engineering, and the use of the finite element method in geotechnical engineering. He has performed research on pile foundations, advanced constitutive modelling of sands and clays, fault rupture propagation through soils and its impact on pipelines, simulation of large deformation problems in geotechnical engineering, and the impact of swelling soils on mat foundations. Moreover, he has offered consulting services on landslide analysis and stabilization. He has authored and co-authored 65 papers in journals and conference proceedings and has supervised 2 PhD Dissertations. Since 2009, he has been the head of the Geomechanics Laboratory of the University of Cyprus. He has served as President of the newly founded Cypriot Society of Soil Mechanics and Geotechnical Engineering (2016-2022) and as Chair of the Department of Civil & Environmental Engineering of the University of Cyprus (2019-2021).

# VENUE MAP



Building KOΔ 07 – Room 010

IN GOOGLE MAPS: <https://goo.gl/maps/zkvstPhUzcG1Dhr96>

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Under the auspices of **CYPRIOΤ SOCIETY OF SOIL MECHANICS AND GEOTECHNICAL ENGINEERING (CSSMGE)**

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