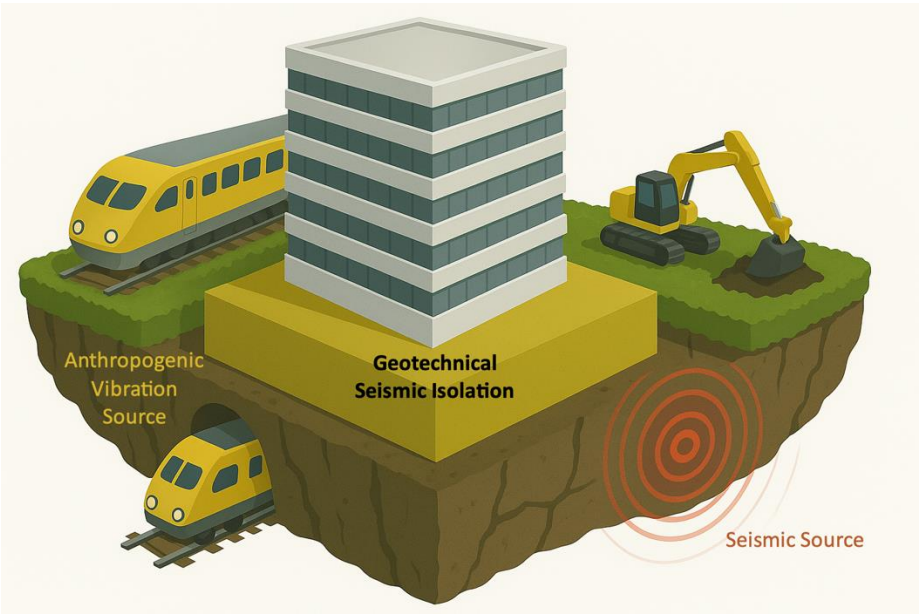
Special Session:

Geotechnical seismic isolation based on sustainable geomaterials



Organisers

Abate Glenda; Department of Civil Engineering and Architecture, University of Catania, Italy (glenda.abate@unict.it)

Glenda Abate is Researcher in Geotechnical Engineering at the University of Catania, Italy. Her research focuses on soil mechanics, dynamic soil-structure interaction, underground structures, seismic risk. Her recent studies explore eco-friendly seismic isolation techniques using recycled tire-derived geomaterials. She is co-author of 70+ publications in international journals and conferences. She is involved in several international research projects, among which the European Research Project SERA ("SOil Frame Interaction Analysis through large-scale tests and advanced numerical finite element modelling"), devoted to assessing the effectiveness of gravel-rubber mixtures as GSI system. She is member of the Global Network for Geotechnical Seismic Isolation (GSI).

Chiaro Gabriele; Department of Civil and Natural Resources Engineering, University of Canterbury, New Zealand (gabriele.chiaro@canterbury.ac.nz)

Gabriele Chiaro is Full Professor of Geotechnical engineering at the University of Canterbury, New Zealand. He leads the "Geotechnical Engineering for Resilience and Sustainability" research group. His research interest includes geotechnical earthquake engineering, experimental and computational geotechnics, and ground improvement, with special focus on soil liquefaction, reuse of waste materials and geotechnical seismic isolation systems. He has participated and led several post-earthquake reconnaissance missions across Asia and New Zealand. He has authored over 170 publications, including 55 journal articles, and received several awards at national and international level. He represents New Zealand in the TC101 and AsRTC1 of the ISSMGE.

Flora Alessandro; Department of Civil, Architectural and Environmental Engineering, University of Naples Federico II, Italy (flora@unina.it)

Alessandro Flora is full professor of Geotechnical Engineering at University of Napoli Federico II, Italy and adjunct Professor at IIT Madras (India). Member of the Board of the International Society of Lifeline and Infrastructure Earthquake Engineering (ISLEE). Chairman of TC301 and Italian representative in

TC211 (ISSMGE). Member of the Board of Italian Group of Geotechnical Researchers. Member of the board of the Italian Geotechnical Journal. Author of books and 150+ research articles. Third Kerisel Lecturer in 2022, and keynote lecturer to many international conferences. He has won the 2020 and 2022 Best Thomas Telford Journals paper on Ground Improvement.

Pitilakis Dimitris; Department of Civil Engineering, Aristotle University of Thessaloniki, Greece (dpitilakis@civil.auth.gr)

Dimitris Pitilakis is a Full Professor of Civil Engineering at the Aristotle University of Thessaloniki, Greece. His research focuses on soil-structure interaction, geotechnical earthquake engineering, and resilience-based design of soil-foundation-structure systems. He has worked on seismic isolation using recycled materials and on earthquake early warning for critical infrastructure. He has authored 180+ publications, developed specialized software, and led both small- and full-scale experimental research. He currently oversees the shaking table and full-scale EuroProteas facility at the Laboratory of Soil Dynamics and Geotechnical Earthquake Engineering at the Aristotle University of Thessaloniki.

Tsang Hing-Ho; School of Science and Engineering, University of Dundee, United Kingdom (htsang001@dundee.ac.uk)

Hing-Ho Tsang is Professor at the University of Dundee, UK, following over 10 years of academic experience each in Australia and Hong Kong. He has published 100+ journal articles and is listed among the World's Top 1% of Scientists for Career-long Impact in Civil Engineering (Elsevier, Stanford University). As a Chartered Professional Engineer, he serves in advisory roles to governments and professional bodies, contributing to the development of seismic design codes and guidelines in various countries. He is the Australian National Delegate to the International Association for Earthquake Engineering and chairs the Global Network for Geotechnical Seismic Isolation (GSI): https://www.gsi-global.org

Session Description

In recent years, innovative geomaterials have been explored to mitigate the impact of seismic and anthropogenic vibrations (from traffic, machinery, etc.) on buildings, bridges, and critical infrastructures, while promoting the resilience and sustainability of these structures. Notable advancements include the development of high-damping materials such as advanced elastomers and soil-rubber mixtures, which effectively dissipate seismic energy. Sustainable geomaterials like geopolymers, EPS geofoam, geosynthetics, and recycled materials are being integrated into systems to enhance vibration isolation and minimise environmental impact. These materials are designed for durability, low maintenance, and long service lives, contributing to promoting a circular economy. Addressing both seismic and human-induced vibrations, such as those from traffic and machinery, these innovations provide an eco-friendly and efficient approach to protecting structures, reducing energy consumption, and enhancing long-term infrastructure resilience.

This emerging research field has garnered worldwide attention, and a systematic discussion must now be encouraged. This need for collaboration serves as a key motivation for the proposal of this special session, which will offer an updated overview of developments in sustainable geotechnical seismic isolation solutions for reducing seismic and human-induced vibrations, analysed through physical and numerical modelling.

Topics will cover facilities, equipment, and measuring techniques for innovative geotechnical seismic isolation materials, physical and numerical modelling, small- and full-scale geotechnical strategies for mitigating seismic and human-induced vibrations, their impact on infrastructure resilience, and how these solutions contribute to the long-term sustainability of geotechnical systems.