



Third Future of Machine Learning in Geotechnics (3FOMLIG), Florence (Italy), Oct 15-17, 2025

WORKSHOP PROGRAM

The complete set of extended abstracts from parallel technical sessions is available in the Book of Technical Abstracts which can be downloaded from [HERE](#).

PDFs of individual contributions can be downloaded by clicking on the respective titles inside the parallel session schedules

Day 1	Wednesday, October 15	
09:00-13:00	Pre-workshop short course “State-of-the-art in Data Centric Geotechnics 2025”	Plenary session (Auditorium)
9:00-9:45 9:45-09:52	Improving site recognition using data-driven site demarcation (Prof. Kok-Kwang PHOON) Q/A	
9:53-10:38 10:38-10:45	Role of databases in data-centric geotechnics (Prof. Jianye CHING) Q/A	
10:45-11:15	Coffee break	
11:15-12:00 12:00-12:07	Accelerating problem-solving in geotechnical engineering with LLM-based agentic AI (Prof. Stephen WU) Q/A	
12:08-12:53 12:53-13:00	Application of LLM to landslide investigations (Prof. Andy YF LEUNG) Q/A	
13:00-14:00	Lunch (independent, not provided)	
14:00-14:30	Opening ceremony	Plenary session (Auditorium)
14:30-15:00	Opening lecture - When Florence dared: visions, intelligences, and technologies that shaped history (Dr. Natacha FABBRI)	Plenary session (Auditorium)
15:00-15:30	Keynote Lecture 1 “ Machine learning-powered nowcasting of rain-induced landslides and their impact ” (Prof. Limin ZHANG)	Plenary session (Auditorium)
15:30-16:00	Break	
16:00-17:15	2nd GeoTechathon: Multiagent LLMs - Part 1 (main convener: Prof. Stephen WU) - Introduction and real-time question invitation from audience - Team presentations - Wrap-up and start of audience voting	Plenary session (Auditorium)
17:15-17:30	Break	
17:30-18:45	2nd GeoTechathon: Multiagent LLMs - Part 2 (main convener: Prof. Stephen WU) - Winner announcement - Panel discussion with judges and organizers answering audience questions - Poster-style interaction at team tables	Plenary session (Auditorium)
19:00-21:00	Icebreaker, Presentation of FOMLIG NextGen AI Museum, FOMLIG NextGen Student contest award presentations	Stellar Agorà

Day 2	Thursday, October 16		
09:00-09:30	Bright Spark Lecture 1 “ Data assimilation and machine learning in braced excavations ” (Dr. Yuanqin TAO)		Plenary session (Auditorium)
09:30-10:00	Keynote Lecture 2 “ A tutorial on differential privacy and its potential application in geotechnical engineering ” (Dr. Takao MURAKAMI)		Plenary session (Auditorium)
10:00-10:20	Break		
10:20-11:35	Parallel technical sessions 1		
Hall	Auditorium	Room 1	Room 2
Session	PS01 Open geodatabases and their use in site characterization in data-scarce regions Session chairs: Monica LÖFMAN, Paul VARDANEGA	PS03 Machine learning techniques for modeling slope vegetation atmosphere interactions under changing climatic Session chairs: Michele CALVELLO, Luca COMEGNA	PS07 Intelligent technologies for risk assessment in tunnel and underground engineering Session chair: Dongming ZHANG
10:20-10:23	Introduction to the topic by session chair(s)	Introduction to the topic by session chair(s)	Introduction to the topic by session chair(s)
10:23-10:30	ID04: Model uncertainty for predicting soft soil embankment settlement using the Finite Element Method Zeling Zhou, Yuanqin Tao, Honglei Sun	ID59: A dataset for landslide prediction through artificial intelligence with potential applications Ignacio Giomi, Evelina Volpe, Yaser Peiro, Michele Baldassini, Francesco Pistolesi, Elisabetta Cattoni	ID09: CycleGAN-enhanced YOLOv8 for underground defect detection Shaoxiang Zeng, Kangmin Zhou, Yuanqin Tao, Honglei Sun
10:31-10:38	ID52: Development of fit-for-practice geodatabases for Stockholm clays: Current status and future work Solve Hoy, David Gaharia	ID76: Machine learning-driven insights into soil-vegetation-atmosphere interactions on climate-impacted slopes Qadri Jibrán, Francesca Ceccato	ID15: Near real time (rock mass) anomaly detection in TBM operational data Paul Unterlaß, Mario Wölflingseder, Thomas Marcher
10:39-10:46	ID51: Building a database of multi-stage excavation performance case records in fine-grained soils Yushan Hua, Paul J. Vardanega	ID36: Integrating slope units with remote-sensed hydrological data for landslide susceptibility mapping using machine learning Yaser Peiro, Luca Ciabatta, Ignacio Giomi, Evelina Volpe, Elisabetta Cattoni	ID27: Geotechnical characterization and face stability of mechanized shield tunnels using machine learning considering cutterhead - soil interaction Animesh Sharma, Ashish Juneja, Raghvendra Pratap Singh
10:47-10:54	ID35: A review of soil photograph databases for machine learning Thomas Plante St-Cyr, François Duhaime, Jean-Sébastien Dubé, Simon Grenier	ID62: Integrating spatiotemporal parameters for landslide susceptibility and hazard prediction: A machine learning framework with SHAP interpretation in Campania, Italy Alireza Duzandeh, Gennaro Sequino, Guido Rianna, Luca Comegna, Roberto Greco, Marco Uzielli, Gianfranco Urciu, Marco Zei	ID50: Application of data assimilation to tunneling simulation using drilling energy Masako Ishii, Nobuyuki Iwamae, Yasuyuki Miyajima, Kazuhiko Masumoto, Takayuki Shuku

10:55-11:02	ID26: A benchmark example for 3D subsurface modelling Takayuki Shuku	ID39: Consideration on applicability of digital twin for short-term prediction of moisture conditions on slopes during heavy rainfall Kazuhiro Oda	ID61: Long term rockburst intensity prediction for underground excavations using supervised and unsupervised machine learning Maria Ferentinou, Ruffin Kayembe
11:03-11:10	ID56: Characterization of soil property profiles from cone penetration test database using dictionary learning Zheng Guan, Yu Wang	ID38: A framework for landslide early warning at catchment scale using IOT monitoring and machine learning Gaetano Pecoraro, Rosa Menichini, Michele Calvello	ID75: Prediction of shield tail clearance based on data-knowledge hybrid drive Yumiao Yan, Wengang Zhang, Weixin Sun
11:11-11:18	ID22: Limitations to geotechnical datasets for machine learning: The case of P-S logging Bruno Stuyts, Esben Dalgaard	ID18: Physics-informed machine learning for rainfall-induced landslide triggering in pyroclastic deposits: A case study Angelo Giuseppe Tarullo, Michele Calvello	Q/A
11:19-11:26	ID77: Data-driven statistical improvements to Toro's shear wave velocity randomization for stochastic seismic ground response analysis in data-scarce regions Mohammed Al-Ajamee	ID95: Physics-Informed approach to model soil-atmosphere interaction in slopes affected by slow-moving landslides Domenico Pomarico, Giovanni Lorusso, Ester Pantaleo, Roberto Cilli, Nunzio Losacco, Alfonso Monaco, Nicola Amoroso, Loredana Bellantuono, Flavia Esposito, Nicoletta Del Buono, Federica Cotecchia, Roberto Bellotti	
11:26-11:35	Q/A	Q/A	
11:45-13:00	Parallel technical sessions 2		
Hall	Auditorium	Room 1	Room 2
Session	PS02 (special session) Enhancing the value of data using ML/AI: temporal evolution of landslide hazard due to climate change in Hong Kong Session chair: Andy LEUNG	PS04 Applications of ML/DL Methods to slope stability monitoring, modelling, and early warning in natural and mining environments Session chair: Filippo CATANI	PS05 Data-knowledge collaborative-driven approaches for geoscience and geoengineering Session chair: Weixin SUN
11:45-11:48	Introduction to the topic by session chair(s)	Introduction to the topic by session chair(s)	Introduction to the topic by session chair(s)
11:48-11:55	Data mountains: unveiling the treasures of Hong Kong's rich open geospatial dataset Rex Kiu, Edward Chu, Andy YF Leung	ID19: Landslide displacement prediction using EGMS ground deformation data Xiaochuan Tang, Zhe Zhang, Lei Zhang, Bo Wang, Yingbo Dong, Filippo Catani	ID16: Estimating the permeability coefficient of recycled soil using an artificial neural network model Thi Phuong Anh To, Kimitoshi Hayano, Anh Thang Bui
11:56-12:03			ID32: Evaluating the importance of key parameters controlling the small-strain shear modulus of clean siliceous sand Samah Said, Adel Ahmadinezhad, Babak Shahbodag, Arman Khoshghalb, Nasser Khalili
12:04-12:11	An intelligent agent for landslide data analysis under climate change Yuan Sun, Yuan Liu, Meng Lu, Mingliang Zhou	ID28: Explainable artificial intelligence for rainfall induced landslide forecasting using Kolmogorov-Arnold networks and dynamic rainfall thresholds Lukas Schild, Ascanio Rosi, Filippo Catani	ID34: Prediction of bearing capacity for shallow foundations on cohesionless soil with differentiable machine learning Tong Qiu, Jun Xiong

12:12-12:19		ID46: Research and development in the field of image recognition of rockfalls on slopes Chihping Kuo, Chihming Liao, Meichun Liu	ID48: Incorporating uncertainty in CPT-based soil classification using self-organizing map approach Seongwook Han, Sungmo Park, Gyungja Jung, Hyunki Kim
12:20-12:27	Storm-based spatiotemporal forecasting of natural terrain landslides using machine learning methods Bingkun Song, Te Xiao	ID63: Interpretable deep learning for ground motion process classification using InSAR time series and geospatial data Yingbo Dong, Lorenzo Nava, Riccardo Palama, Oriol Monserrat, Davide Festa, Mario Floris, Filippo Catani	ID53: Assessing the potential of CFA piling rig telemetry data for stratigraphic profiling and optimised pile installation John Hopkins
12:28-12:35		ID70: Artificial neural network -based optimization of open pit design in iron mining Gabriela Buitrago Frainz, Henrique Guimarães Pedrosa	ID54: GeoPhys-GPR: Physics-constrained prediction of marine clay parameters from small and sparse datasets — A Norwegian case study Wu Hongtao, Chen Zhaohui
12:36-12:43	LLM-based agents for automated forensic landslide investigation: bridging slope feature extraction, geological modeling, and numerical analysis Hansong Pang, Yang Liu, Horace MK Lo, Andy YF Leung	ID74: Discrete-time physics-informed neural networks modelling for 1D consolidation Sina Akhyani, Babak Shahbodagh, Mohammad Vahab, Nasser Khalili	ID57: Machine learning-based optimization of literature models for submarine cable installation in sandy seabeds Davide Gritti, Pietro Marveggio, Daniele Magri, Gabriele Della Vecchia
12:44-12:50		Q/A	ID78: Geospatial modeling of geotechnical layer based on 3D point cloud and 3D deep learning for Seoul, South Korea Han-Saem Kim
12:51-13:00		Q/A	Q/A
13:00-14:30	Lunch		Stellar Agorà
13:00-14:30	3 rd GEOAI Editors' Meeting		Super Mario
14:30-15:45	EduHackathon - Large Language Models in geotechnical education - Part 1 (main convener: Prof. Michele CALVELLO) Series of presentations		Plenary session (Auditorium)
15:45-16:00	Break		
16:00-17:15	EduHackathon - Large Language Models in geotechnical education - Part 2 (main convener: Prof. Michele CALVELLO) "Introduction and discussion with the audience"		Plenary session (Auditorium)
17:15-17:45	Break		
17:45-19:45	7 th Machine Learning in Geotechnics Dialogue (7MLIGD) – "Trustworthy data-centric geotechnics" (main convener: Dr. Patrizia VITALE)		Plenary session (Auditorium)
20:30-23:00	Social Dinner – Ristorante "Il Bargello", Piazza della Signoria.		

Day 3	Friday, October 17		
08:30-09:00	Bright Spark Lecture 2 " Machine Learning in Geotechnical Engineering: Opportunity or Overstated Hype? " (Dr. Ze Zhou WANG)		Plenary session (Auditorium)
09:00-09:30	Industry Keynote " Generation of synthetic geotechnical data from geophysical ground model data " (Dr. Dongfang QU)		Plenary session (Auditorium)
09:30-10:00	Bright Spark Lecture 3 " Data-driven geotechnical design - Bridging the gap between research and practice " (Dr. Monica LÖFMAN)		Plenary session (Auditorium)
10:00-10:20	Break		
10:20-11:35	Parallel technical sessions 3		
Hall	Auditorium	Room 1	Room 2
Session	PS09 Data-integrated risk assessment in geological and geotechnical engineering Conveners Session chairs: Yuanqin TAO, Chong TANG	PS11 Machine learning for resilient geoinfrastructure Session chair: Enrico SORANZO	PS12 Values of machine learning in geotechnical reliability and risk Session chairs: Zi-Jun CAO, Tengyuan ZHAO
10:20-10:23	Introduction to the topic by session chair(s)	Introduction to the topic by session chair	Introduction to the topic by session chairs
10:23-10:30	ID03: A modular Gaussian process regression toolbox for uncertainty-aware geotechnical site characterization Orestis Zinas Zinas, Iason Papaioannou, Ronald Schneider, Pablo Cuéllar	ID13: Influence of climate on the 10-year evaluation of the radon content in soil air with machine learning Wolfgang Jimmy Wehr, Enrico Soranzo	ID07: Using Gaussian Process Regression for probabilistic site characterization of spatial variability from multi-sourced and multi-fidelity measurements Tengyuan Zhao, Yatong Qi
10:31-10:38	ID14: Can visual foundation models reframe rock mass discontinuity identification? Jiawei Wang, Jun Zheng	ID23: Machine learning prediction of soil particle size distribution from smartphone images Enrico Soranzo	ID08: A Diffusion-Based Method for subsurface geological cross-section database generation and its applications Runhong Zhang, Haoran Chang
10:39-10:46	ID17: A novel method for the quantitative characterization of rock block systems to enhance rockfall hazard prediction Zheqi Tian, Jun Zheng, Ruichen Zhang	ID47: Leveraging pretrained audio networks for vibration-based scour monitoring in offshore wind turbines Kyeong-Sun Kim, Tae-Hun Hwang, Beom-Soo Kim., Hyeong-Seung Yu, Sung-Ryul Kim	ID11: Recurrence plot-based numerical image analysis for evaluating infrared thermal characteristics according to cavity depth Byeong-Su Jang, Won-Woo Choi, Jong Sik Kim, Yong Shin Yoo, Hyung-Koo Yoon
10:47-10:54	ID20: Predicting creep behavior of rockfill materials using LSTM networks Yu Su, Wenbo Zhao	ID58: Explainable insight into the vision-based classification of soil core samples from close-range images Andreas-Nizar Granitzer, Johannes Beck, Johannes Leo, Franz Tschuchnigg	ID33: Integrating geotechnical and geophysical data for site characterization using Multi-Output Gaussian Process Yuxiang Ren, Chisato Konishi

10:55-11:02	ID31: Multivariate outlier detection with the Minimum Information Dependence Model Taiga Saito, Yu Otake, Stephen Wu, Keisuke Yano	ID71: AI-driven soil core analysis: A step toward quick, non-invasive site characterization Joanne Boulos, Véronique Eglin, Kerautret Bertrand, Larue Edith, Côme Jean-Marie	ID68: Depth-based interpolation strategy with topographic information for predicting the soil-rock interface in mountainous regions Shibo Zhao, Xuesong Zeng, Xuan-Hao Wang, Lining Zheng, Deyuan Zhao, Zi-Jun Cao
11:03-11:10	ID40: A preliminary study on the standardization of design seismic based on similarity of borehole data Reina Noda, Yu Otake, Niki Tanaka, Kimitoshi Sakai	ID72: Predicting fatigue failure in treated soils using Gradient Boosting Classification Julien Borderon, Nathalie Dufour	ID69: Learning and comparison of Markov Random Field Models for geological modelling Xingzhou Chen, Linhao Zuo, Qiang Liu, Zi-Jun Cao
11:11-11:18	ID64: Liquefaction Hazard Mapping: Geostatistical Approach Applied to Central Business District (Christchurch, New Zealand) Lorenzo Dezio, Valerio Piattelli, Diego Di Curzio, Salvatore Santangelo, Giovanna Vessia	Q/A	ID99: Subsurface modeling from borehole descriptions using a lightweight Transformer-based sequence labeling approach Roberto Cilli, Domenico Pomarico, Nunzio Losacco, Francesca Santaloia, Ester Pantaleo, Loredana Bellantuono, Nicola Amoroso, Federica Cotecchia, Roberto Bellotti
11:19-11:26	Q/A	Q/A	Q/A
11:26-11:35	Q/A	Q/A	Q/A
11:45-13:00	Parallel technical sessions 4		
Hall	Auditorium	Room 1	
Session	PS09 (continues) Data-integrated risk assessment in geological and geotechnical engineering Conveners Session chairs: Yuanqin TAO, Chong TANG	PS06 Meta-modelling for geotechnical engineering: bridging data gaps with AI and simulations Session chair: Marco D'IGNAZIO	
11:45-11:48	Introduction to the remaining topics by session chair(s)	Introduction to the topic by session chair	
11:48-11:55	ID66: Physics-informed neural networks for consolidation of sludge dewatered in geotextile tubes Kaiyue Chen, Shaoxiang Zeng, Shengtai Ge, Pengyuan Guo	ID25: Forecasting of drilling parameters through geophysics Maximiliano Lope Simão, Luciano Mozer Assis, Brenda Rafaela S Freitas, Thais Stefany Diniz, Nicholas Marino, Gustavo Dimas Franco Freitas	
11:56-12:03	ID73: Uncovering the relationship between pavement surface roughness and soil-dependent structural stiffness using geotechnical trend modelling Frank Amofa-Agyemang, Yu Otake, Daijiro Mizutani	ID29: Intelligent reconstruction of MWD data using deep learning: Toward reliable data series for smart tunnelling Alla Sapronova, Franziska Klein, Thomas Marcher	
12:04-12:11	ID96: A case study for fully coupled soil-layer delineation Hassan Kamyab Farahbakhsh, Jianye Ching	ID41: Exploiting database influence on the prediction of offshore plate anchor uplift capacity through PCE-based metamodels Alessio Mentani, Ritesh Gupta, Anamitra Roy, Rene Kurniadi, Shiahouey Chow	

12:12-12:19	ID97: Data-driven risk assessment of seismic local site amplification and rock slope instabilities: The case study of Popoli Terme (Italy) Valerio Piattelli, Giovanna Vessia, Luciano Caroprese	ID42: Challenges, merits and limits of PINN applied to clay consolidation processes Pietro Marveggio, Massimiliano Cremonesi, Gabriele Della Vecchia	
12:20-12:27	Q/A	ID49: Spatial-temporal Bayesian updating of consolidation parameters in coastal sediments using GPR and particle filters Kosei Kawata	
12:28-12:35	Q/A	ID65: Reliability-based verification of serviceability limit states for a braced excavation using nonlinear finite element analyses Stephane Commend, Bruno Sudret	
12:36-12:43	Q/A	ID67: Hybrid LSTM-based surrogate modelling of quay walls Kacper Cerek, Elnaz Hadjiloo, Jürgen Grabe	
12:44-12:50	Q/A	ID81: Predicting shallow foundation design adequacy using machine learning Ardy Arsyad, Mohd Nur Asmawis, Patrick Kenneth, Fidya Fattimiyah, Deniel Edyson Ma	
12:51-13:00	Q/A	Q/A	
13:00-14:30	Lunch		
14:30-15:00	FOMLIG NextGen session: reporting on activities and illustration of next steps		Plenary session (Auditorium)
15:00-15:30	GEO-AI Distinguished Lecture - Rapid advances in digital technology are bringing revolutionary changes to the construction industry (Mr. Yoshihiko RIHO)		Plenary session (Auditorium)
15:30-16:00	Closing ceremony and presentation of 4FOMLIG		Plenary session (Auditorium)
16:30-18:00	2nd FOMLIG Council Executive Board Meeting		Room 2
	Saturday, October 18		
	Social tours		