



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

WORKSHOP PROGRAM

Day 1	Wednesday, October 15 2025	
09:00-13:00	Pre-workshop short course "A primer to machine learning and artificial intelligence in geotechnical engineering"	Plenary session (Auditorium)
9:00-9:45	<u>Trustworthy data-centric geotechnics</u> (Prof. Kok-Kwang PHOON)	
9:45-09:52	Q/A	
9:53-10:38	<u>Role of databases in data-centric geotechnics</u> (Prof. Jianye CHING)	
10:38-10:45	Q/A	
10:45-11:15	Coffee break	
11:15-12:00	Accelerating problem-solving in geotechnical engineering with LLM-based agentic AI (Prof. Stephen WU)	
12:00-12:07	Q/A	
12:08-12:53	Application of LLM to landslide investigations (Prof. Andy YF LEUNG)	
12:53-13:00	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)	Plenary session (Auditorium)
17:15-17:30	Break	

17:30-18:45	2nd GeoTechathon: Multiagent LLMs - Part 2 (main convener: Prof. Stephen WU)		Plenary session (Auditorium)
19:00-21:00	Icebreaker, Presentation of FOMLIG NextGen AI Museum, FOMLIG NextGen Student contest award presentations		Stellar Agora
Day 2	Thursday, October 16 2025		
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		Auditorium, Workshop Grande, Workshop Media
Hall	Auditorium	Workshop Grande	Workshop Media
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 Jibran, Francesca Ceccato	ID10: Agentic AI-based tunnel settlement safety management system: S case study at the Hong Kong-Zhuhai-Macau bridge Li Zeng, Limin Zhang, Jian He
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	ID15: Near real time (rock mass) anomaly detection in TBM operational data Paul Unterlaß, Mario Wölflingseder, Thomas Marcher

		<u>Yaser Peiro</u> , Luca Ciabatta, Ignacio Giomi, Evelina Volpe, Elisabetta Cattoni	
10:47-10:54	ID35: A review of soil photograph databases for machine learning <u>Thomas Plante St-Cyr</u> , 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 <u>Alireza Duzandeh</u> , Gennaro Sequino, Guido Rianna, Luca Comegna, Roberto Greco, Marco Uzielli, Gianfranco Urciu, Marco Zei	ID27: Geotechnical characterization and face stability of mechanized shield tunnels using machine learning considering cutterhead - soil interaction <u>Animesh Sharma</u> , Ashish Juneja, Raghvendra Pratap Singh
10:55-11:02	ID26: A benchmark example for 3D subsurface modelling <u>Shuku Takayuki</u>	ID39: Consideration on applicability of digital twin for short-term prediction of moisture conditions on slopes during heavy rainfall <u>Oda Kazuhiro</u>	ID50: Application of data assimilation to tunneling simulation using drilling energy <u>Masako Ishii</u> , Nobuyuki Iwamae, Yasuyuki Miyajima, Kazuhiko Masumoto, Takayuki Shuku
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 <u>Gaetano Pecoraro</u> , Rosa Menichini, Michele Calvello	ID61: Long term rockburst intensity prediction for underground excavations using supervised and unsupervised machine learning <u>Maria Ferentinou</u> , Ruffin Kayembe
11:11-11:18	ID22: Limitations to geotechnical datasets for machine learning: The case of P-S logging <u>Bruno Stuyts</u> , Esben Dalgaard	ID18: Physics-informed machine learning for rainfall-induced landslide triggering in pyroclastic deposits: A case study <u>Angelo Giuseppe Tarullo</u> , Michele Calvello	ID75: Prediction of shield tail clearance based on data-knowledge hybrid drive <u>Yumiao Yan</u> , Wengang Zhang, Weixin Sun
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 <u>Mohammed Al-Ajamee</u>	ID95: Physics-Informed approach to model soil-atmosphere interaction in slopes affected by slow-moving landslides <u>Domenico Pomarico</u> , Giovanni Lorusso, Ester Pantaleo, Roberto Cilli, Nunzio Losacco, Alfonso Monaco, Nicola Amoroso, Loredana Bellantuono, Flavia Esposito, Nicoletta Del Buono, Federica Cotecchia, Roberto Bellotti	Q/A
11:26-11:35	Q/A	Q/A	Q/A
11:45-13:00	Parallel technical sessions 2		Auditorium, Workshop Grande, Workshop Media

Hall	Auditorium	Workshop Grande	Workshop Media
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)
11:48-12:03	Data mountains: unveiling the treasures of Hong Kong's rich open geospatial dataset Rex Kiu, Edward Chu, <u>Andy YF Leung</u>	ID12: Fast inverse analysis of landslides with prompt remote sensing-based runout quantification and differentiable physics-informed machine learning model <u>Weifan Xu</u> , <u>Limin Zhang</u>	ID16: Estimating the permeability coefficient of recycled soil using an artificial neural network model <u>Thi Phuong Anh To</u> , <u>Kimitoshi Hayano</u> , <u>Anh Thang Bui</u>
11:56-12:03		ID19: Landslide displacement prediction using EGMS ground deformation data <u>Xiaochuan Tang</u> , <u>Zhe Zhang</u> , <u>Lei Zhang</u> , <u>Bo Wang</u> , <u>Yingbo Dong</u> , <u>Filippo Catani</u>	ID32: Evaluating the importance of key parameters controlling the small-strain shear modulus of clean siliceous sand <u>Samah Said</u> , <u>Adel Ahmadinezhad</u> , <u>Babak Shahbodag</u> , <u>Arman Khoshghalb</u> , <u>Nasser Khalili</u>
12:04-12:11	An intelligent agent for landslide data analysis under climate change <u>Yuan Sun</u> , <u>Yuan Liu</u> , <u>Meng Lu</u> , <u>Mingliang Zhou</u>	ID28: Explainable artificial intelligence for rainfall induced landslide forecasting using Kolmogorov-Arnold networks and dynamic rainfall thresholds <u>Lukas Schild</u> , <u>Ascanio Rosi</u> , <u>Filippo Catani</u>	ID34: Prediction of bearing capacity for shallow foundations on cohesionless soil with differentiable machine learning <u>Tong Qiu</u> , <u>Jun Xiong</u>
12:12-12:19		ID46: Research and development in the field of image recognition of rockfalls on slopes <u>Chihping Kuo</u> , <u>Chihming Liao</u> , <u>Meichun Liu</u>	ID48: Leveraging LLMs for spatial prediction of undrained shear strength in soft soils <u>Hyunki Kim</u>
12:20-12:27	Storm-based spatiotemporal forecasting of natural terrain landslides using machine learning methods <u>Bingkun Song</u> , <u>Te Xiao</u>	ID63: Interpretable deep learning for ground motion process classification using InSAR time series and geospatial data <u>Yingbo Dong</u> , <u>Lorenzo Nava</u> , <u>Riccardo Palama</u> , <u>Oriol Monserrat</u> , <u>Davide Festa</u> , <u>Mario Floris</u> , <u>Filippo Catani</u>	ID53: Assessing the potential of CFA piling rig telemetry data for stratigraphic profiling and optimised pile installation <u>John Hopkins</u>
12:28-12:35		ID70: Artificial neural network -based optimization of open pit design in iron mining <u>Gabriela Buitrago Frainz</u> , <u>Henrique Guimarães Pedrosa</u>	ID54: GeoPhys-GPR: Physics-constrained prediction of marine clay parameters from small and sparse datasets — A Norwegian case study <u>Wu Hongtao</u> , <u>Chen Zhaohui</u>

12:36-12:43	LLM-based agents for automated forensic landslide investigation: bridging slope feature extraction, geological modeling, and numerical analysis <u>Hansong Pang</u> , Yang Liu, Horace MK Lo, Andy YF Leung	ID74: Discrete-time physics-informed neural networks modelling for 1D consolidation <u>Sina Akhyani</u> , Babak Shahbodagh, Mohammad Vahab, Nasser Khalili	ID57: Machine learning-based optimization of literature models for submarine cable installation in sandy seabeds <u>Davide Gritti</u> , Pietro Marveggio, Daniele Magri, Gabriele Della Vecchia
12:44-12:50		ID55: Explore the effect about factor selection on regional landslide susceptibility mapping using Iterative Classifier Optimizer model <u>Haoyuan Hong</u>	ID78: Geospatial modeling of geotechnical layer based on 3D point cloud and 3D deep learning for Seoul, South Korea <u>Han-Saem Kim</u>
12:51-13:00	Q/A	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)		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)		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 2025		
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		Auditorium, Workshop Grande, Workshop Media
Hall	Auditorium	Workshop Grande	Workshop Media
Session	<p style="text-align: center;">PS09</p> <p style="text-align: center;">Data-integrated risk assessment in geological and geotechnical engineering</p> <p style="text-align: center;">Conveners</p> <p style="text-align: center;">Session chairs: Yuanqin TAO, Chong TANG</p>	<p style="text-align: center;">PS11</p> <p style="text-align: center;">Machine learning for resilient geoinfrastructure</p> <p style="text-align: center;">Session chair: Enrico SORANZO</p>	<p style="text-align: center;">PS12</p> <p style="text-align: center;">Values of machine learning in geotechnical reliability and risk</p> <p style="text-align: center;">Session chairs: Zi-Jun CAO, Tengyuan ZHAO</p>
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	<p>ID03: A modular Gaussian process regression toolbox for uncertainty-aware geotechnical site characterization</p> <p><u>Orestis Zinas Zinas</u>, Iason Papaioannou, Ronald Schneider, Pablo Cuéllar</p>	<p>ID13: Influence of climate on the 10-year evaluation of the radon content in soil air with machine learning</p> <p><u>Wolfgang Jimmy Wehr</u>, Enrico Soranzo</p>	<p>ID07: Using Gaussian Process Regression for probabilistic site characterization of spatial variability from multi-sourced and multi-fidelity measurements</p> <p>Tengyuan Zhao, <u>Yatong Qi</u></p>
10:31-10:38	<p>ID14: Can visual foundation models reframe rock mass discontinuity identification?</p> <p><u>Jiawei Wang</u>, Jun Zheng</p>	<p>ID23: Machine learning prediction of soil particle size distribution from smartphone images</p> <p><u>Enrico Soranzo</u></p>	<p>ID08: A Diffusion-Based Method for subsurface geological cross-section database generation and its applications</p> <p><u>Runhong Zhang</u>, Haoran Chang</p>
10:39-10:46	<p>ID17: A novel method for the quantitative characterization of rock block systems to enhance rockfall hazard prediction</p> <p><u>Zheqi Tian</u>, Jun Zheng, Ruichen Zhang</p>	<p>ID47: Leveraging pretrained audio networks for vibration-based scour monitoring in offshore wind turbines</p> <p>Kyeong-Sun Kim, <u>Tae-Hun Hwang</u>, Beom-Soo Kim., Hyeong-Seung Yu, Sung-Ryul Kim</p>	<p>ID11: Recurrence plot-based numerical image analysis for evaluating infrared thermal characteristics according to cavity depth</p> <p><u>Byeong-Su Jang</u>, Won-Woo Choi, Jong Sik Kim, Yong Shin Yoo, Hyung-Koo Yoon</p>
10:47-10:54	<p>ID20: Predicting creep behavior of rockfill materials using LSTM networks</p> <p><u>Yu Su</u>, Wenbo Zhao</p>	<p>ID58: Explainable insight into the vision-based classification of soil core samples from close-range images</p> <p><u>Andreas-Nizar Granitzer</u>, Johannes Beck, Johannes Leo, Franz Tschuchnigg</p>	<p>ID33: Integrating geotechnical and geophysical data for site characterization using Multi-Output Gaussian Process</p> <p><u>Yuxiang Ren</u>, Chisato Konishi</p>
10:55-11:02	<p>ID31: Multivariate outlier detection with the Minimum Information Dependence Model</p> <p><u>Taiga Saito</u>, Yu Otake, Stephen Wu, Keisuke Yano</p>	<p>ID71: AI-driven soil core analysis: A step toward quick, non-invasive site characterization</p> <p><u>Joanne Boulos</u>, Véronique Eglin, Kerautret Bertrand, Larue Edith, Côme Jean-Marie</p>	<p>ID68: Depth-based interpolation strategy with topographic information for predicting the soil-rock interface in mountainous regions</p> <p>Shibo Zhao, Xuesong Zeng, Xuan-Hao Wang, Lining Zheng, Deyuan Zhao, <u>Zi-Jun Cao</u></p>
11:03-11:10	<p>ID40: A preliminary study on the standardization of design seismic based on similarity of borehole data</p> <p><u>Reina Noda</u>, Yu Otake, Niki Tanaka, Kimitoshi Sakai</p>	<p>ID72: Predicting fatigue failure in treated soils using Gradient Boosting Classification</p> <p><u>Julien Borderon</u>, Nathalie Dufour</p>	<p>ID69: Learning and comparison of Markov Random Field Models for geological modelling</p> <p><u>Xingzhou Chen</u>, Linhao Zuo, Qiang Liu, Zi-Jun Cao</p>

11:11-11:18	ID64: Intrinsic Random Function Method for liquefaction potential index mapping through piezocone measures: The case study of Christchurch (NZ) <u>Lorenzo Dezio Dezio</u> , Valerio Piattelli, Diego Di Curzio, Salvatore Santangelo, Giovanna Vessia	ID05: Construction parameter identification of vibro stone columns based on U-Net Convolutional Neural Network <u>Yanguo Zhou</u> , Xinze Ye, Chun Wang	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		Auditorium, Workshop Media
Hall	Auditorium	Workshop Grande	
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 <u>Kaiyue Chen</u> , Shaoxiang Zeng, Shengtai Ge, Pengyuan Guo	ID25: Forecasting of drilling parameters through geophysics <u>Maximiliano Lope Simão</u> , 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 <u>Frank Amofa-Agyemang</u> , Yu Otake, Daijiro Mizutani	ID29: Intelligent reconstruction of MWD data using deep learning: Toward reliable data series for smart tunnelling <u>Alla Saproнова</u> , Franziska Klein, Thomas Marcher	
12:04-12:11	ID96: A case study for fully coupled soil-layer delineation Hassan Kamyab Farahbakhsh, <u>Jianye Ching</u>	ID41: Exploiting database influence on the prediction of offshore plate anchor uplift capacity through PCE-based metamodels <u>Alessio Mentani</u> , 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	ID42: Challenges, merits and limits of PINN applied to clay consolidation processes	

	instabilities: The case study of Popoli Terme (Italy) <u>Valerio Piattelli</u> , Giovanna Vessia, Luciano Caroprese	<u>Pietro Marveggio</u> , Massimiliano Cremonesi, Gabriele Della Vecchia	
12:20-12:27	ID98: Dynamic prediction of dam-break flows based on image-driven deep learning model <u>Lei Cheng-Ming</u> , Wang Shun	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 <u>Stephane Commend</u> , Bruno Sudret	
12:36-12:43	Q/A	ID67: Hybrid LSTM-based surrogate modelling of quay walls <u>Kacper Cerek</u> , Elnaz Hadjiloo, Jürgen Grabe	
12:44-12:50	Q/A	ID81: Predicting shallow foundation design adequacy using machine learning <u>Ardy Arsyad</u> , 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 (Dr. 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		Workshop Media
Saturday, October 18 2025			
	Social tours		