
Contents

Part I Keynote

- 1 **Problems in Buildings and Public Works Derived from Soils with Unsteable Structure and Soils with Large Volume Instability.** 3
Carlos Delgado Alonso-Martirena
- 2 **Translating Geotechnical Risk in Financial Terms** 11
Alessandro Palmieri
- 3 **Large Deformation of Tunnel in Slate-Schistose Rock.** 17
Faquan Wu, Jinli Miao, Han Bao, and Jie Wu

Part II Addressing Geological Uncertainties in Major Engineering Projects

- 4 **Effect of Petrogenesis on the Suitability of Some Pelitic Rocks as Construction Aggregates in the Tropics** 27
Tochukwu A.S. Ugwoke and Celestine O. Okogbue
- 5 **Geological Society of London Engineering Group Working Party on Periglacial and Glacial Engineering Geology** 31
David Giles, Martin Culshaw, Laurance Donnelly, David Evans, Mike de Freitas, James Griffiths, Sven Lukas, Christopher Martin, Anna Morley, Julian Murton, David Norbury, and Mike Winter
- 6 **New Methods of Determining Rock Properties for Geothermal Reservoir Characterization** 37
Mathias Nehler, Philipp Mielke, Greg Bignall, and Ingo Sass
- 7 **Application of Reliability Methods to Tunnel Lining Design in Weak Heterogeneous Rockmasses** 41
John C. Langford, N. Vlachopoulos, M.S. Diederichs, and D.J. Hutchinson
- 8 **Geological and Geotechnical Difference on Both Sides of the Same Tunnel.** 47
Pedro Olivença and Vítor Santos
- 9 **Development of Probabilistic Geotechnical Ground Models for Offshore Engineering.** 53
Konstantinos Symeonidis and Clark Fenton

10	Baixo Sabor (Portugal) Upstream Dam Foundation: From Design Geological Predictions to Construction Geological Facts and Geotechnical Solutions.	59
	Jorge Neves, Celso Lima, Fernando Ferreira, and João Machado	
11	The Foundations of Constructions in Dobrogea—Romania, on Water Sensitive Soils, Loess.	65
	Gabriela Brîndusa Cazacu, Nicolae Botu, and Daniela Grigore	
12	Influence of Micro-texture on the Geo-engineering Properties of Low Porosity Volcanic Rocks	69
	Ündül Ömer and Amann Florian	
13	Conceptual Geological Models, Its Importance in Interpreting Vadose Zone Hydrology and the Implications of Being Excluded	73
	Matthys A. Dippenaar and J. Louis van Rooy	
14	Treatment of Fossil Valley in Dam Area: A Case Study	79
	A.K. Singh and Bhatnagar Sharad	

Part III Applied and Active Tectonics

15	A Case Study of Three-dimensional Determination of Stress Orientation to Crystalline Rock Samples in Wenchuan Earthquake Fault Scientific Drilling Project Hole-2.	87
	Weiren Lin, Lianjie Wang, Junwen Cui, Dongsheng Sun, and Manabu Takahashi	
16	Mathematical-Numerical Modeling of Tectonic Fault Zone (Tadzhikistan)	91
	Ernest V. Kalinin, Olga S. Barykina, and Leili L. Panasyan	
17	Neotectonic and Mass Movements on the New Fez-Taza Highway (Northern Morocco)	95
	Tabyaoui Hassan, Deffontaines Benoît, Chaouni Abdel-Ali, El Hammichi Fatima, Lahsaini Meriem, Mounadel Ahlam, Magalhaes Samuel, and Fortunato Gérardo	
18	Importance of Geological Map Updates in Engineering Geology, Application to the Rif-Chain and Its Foreland (Northern Morocco)	101
	Deffontaines Benoît, Tabyaoui Hassan, El Hammichi Fatima, Chaouni Abdel-Ali, Mounadel Ahlam, Lahsaini Meriam, Magalhaes Samuel, and Fortunato Gérardo	
19	Disaster Awareness Education for Children in Schools Around Geological Hazard Prone Areas in Indonesia	107
	Muslim Dicky, Evi Haerani, Motohiko Shibayama, Masaaki Ueshima, Naoko Kagawa, and Febri Hirnawan	

20	Analysis of Recent Deformation in the Southern Atlas of Tunisia Using Geomorphometry	113
	Mehdi Ben Hassen, Benoît Deffontaines, and Mohamed Moncef Turki	
21	Spatial Analysis of Remote Sensing Data in Early Stage of a Seismo-tectonic Research	119
	Novakova Lucie	
22	Geomorphic Evidence of Active Tectonics: The Case of Djemila Fault (Eastern Algeria)	125
	Youcef Bouhadad	
23	Seismic Cycle of the Southern Apennine Deformation Front: The Taranto Gulf Marine Terraces Inputs and Implications	129
	Benoît Deffontaines, Gérardo Fortunato, and Samuel Magalhaes	
24	New Structural and Geodynamic Coastal Jeffara Model (Southern Tunisia) and Engineering Implications	139
	Rim Ghedhoui, Benoît Deffontaines, and Mohamed Chedly Rabia	
25	Tunisia: A Mature Case Example of Structural Extrusion	147
	Benoît Deffontaines, Mehdi Ben Hassen, and Rim Ghedhoui	
26	The Extrusion of South-West Taiwan: An Offshore-Onshore Synthesis	153
	Benoît Deffontaines, Liu Char-Shine, and Chen Rou-Fei	
27	Active Tectonic Risk Assessment—Problems with Soil and Soft Sediment Deformation Structures.	161
	Philip E.F. Collins	
28	Formation of Earthquake Faults by the Fukushima Hamadori Earthquake and an Estimation of Displacement Distribution Around the Faults Using Airborne LiDAR Data	167
	Shunsuke Shinagawa, Shuji Anan, Yasuhito Sasaki, Sakae Mukoyama, Shin-ichi Homma, and Yoko Kobayashi	
 Part IV Applied Geology for Infrastructure Projects		
29	Field Monitoring of the Behavior of Pile-Net Composite Foundation in Oversize-Deep-Soft Soil	175
	Yu-feng Wang, Qian-gong Cheng, and Jiu-jiang Wu	
30	Deformation Behavior of Excavated High Loess Slope Reinforced with Soil Nails and Pre-reinforced-Stabilizing Piles	185
	Qian-gong Cheng, Yu-feng Wang, and Jiu-jiang Wu	
31	Effects of Alkali Silica/Aggregate Reaction on Concrete Structures in Bundelkhand Region, Central India	195
	Suresh Chandra Bhatt and Bhuwan Chandra Joshi	

32	Applied Engineering Geology Methods for Exemplar Infrastructure Projects in Malopolskie and Podkarpackie Provinces	203
	Zbigniew Bednarczyk and Adam Szykiewicz	
33	A Brief Overview of the Typical Engineering Characteristics of Tropical Red Soils.	211
	George Brink	
34	Remote Analysis of Rock Slopes with Terrestrial Laser Scanning for Engineering Geological Tasks in Reservoir Planning	215
	Hieu Trung Nguyen, Tomás M. Fernandez-Steege, Hans-Joachim Köhler, and Rafiq Azzam	
35	Dynamically Loaded Anchorages	219
	Santoro Federica, Monia Calista, Antonio Pasculli, and Nicola Sciarra	
36	LiDAR and Discrete Fracture Network Modeling for Rockslide Characterization and Analysis	223
	Matthieu Sturzenegger, Tim Keegan, Ann Wen, David Willms, Doug Stead, and Tom Edwards	
37	Experimental Study on Water Sensitivity of the Red Sand Foundation in Angola	229
	Wei Zhang, Zhenghong Liu, Jianguo Zheng, Sumin Zhang, and Yongtang Yu	
38	Geological Characterization and Stability Conditions of the Motorway Tunnels of Arrangement Project of the NR43, Melbou (W. Béjaïa).	237
	Nassim Hallal and Rachid Bougdal	
39	A Modified Freeze-Thaw Laboratory Test for Pavement Sub Soils Affected by De-icing Chemicals	243
	Assel Sarsembayeva and Philip Collins	
40	A Geotechnical and Geochemical Characterisation of Oil Fire Contaminated Soils in Kuwait	249
	Humoud Al-Dahani, Paul Watson, and David Giles	
41	Comparison Between Neural Network and Finite Element Models for the Prediction of Groundwater Temperatures in Heat Pump (GWHP) Systems	255
	Glenda Taddia, Stefano Lo Russo, and Vittorio Verda	
42	Ground Stiffness Evaluation Using the Soil Stiffness Gauge (SSG).	259
	Mário Quinta-Ferreira	
43	Influence of Fracture Systems and Weathering on the Sustainability of Rock Excavation Made for the Purpose of Infrastructure Construction.	263
	Radoslav Varbanov, Miroslav Krastanov, and Rosen Nankin	

44	Route Alignment and Optimization of Railway Based on Geological Condition	269
	Weihua Zhao, Nengpan Ju, and Jianjun Zhao	
45	Engineering Properties of Permian Clay Tuffs	273
	John Johnston, Stephen Fityus, Olivier Buzzi, Chris Rodgers, and Robert Kingsland	
46	Vertical Harbour Quay Rehabilitation Using Ground Anchors	279
	Liliana Ribeiro and Alexandre Santos-Ferreira	
47	The Importance of the Existing Engineering Geological Conditions During the Building Construction on the Terrain Affected by Sliding.	285
	Dragoslav Rakić, Zoran Berisavljević, Irena Basarić, and Uroš Đurić	
48	GIS Based, Heuristic Approach for Pipeline Route Corridor Selection.	291
	Ludwig Schwarz, Klaus Robl, Walter Wakolbinger, Harry Mühling, and Pawel Zaradkiewicz	
49	A Study of Ground Natural Temperature Along Tabriz Metro Line 2, Iran	295
	Ebrahim Asghari-Kaljahi, Karim Yousefi-bavil, and Mahyar Babazadeh	
50	The Challenges of Site Investigations, Dredging, and Land Reclamation: A Port Hedland (Western Australia) Project Perspective	299
	P. Baker, J. Woods, M. Page, and F. Schlack	
51	The Role of Geological Analysis in the Design of Interventions for the Safety of the Road Asset. Some Examples	303
	Serena Scarano, Roberto Laureti, and Stefano Serangeli	
52	Groundwater Level Variation and Deformation in Clays Characteristic to the Helsinki Metropolitan Area	309
	Tiina-Liisa Toivanen and Jussi Leveinen	
53	Determine of Tunnel Face Stability Pressure in EPB Machine with Use Analytical Methods (Case Study: Mashhad Metro Line2)	313
	Mehdi Abbasi and Mohsen Abbasi	
54	Numerical Modeling of Interrelationships Between Linear Transportation Infrastructures and Hydro-geological Hazard in Floodplains.	317
	Rosamaria Trizzino	
55	Convergence Predictions and Primary Support Optimization of the Tunnel Progon	323
	Zoran Berisavljevic, Svetozar Milenkovic, Dusan Berisavljevic, and Nenad Susic	

56	Quarry Site Selection and Geotechnical Characterization of Ballast Aggregate for Ambo-Ijaji Railway Project in Central Ethiopia: An Integrated GIS and Geotechnical Approach	329
	Regessa Bayisa, Raghuvanshi Tarun Kumar, and Kebede Seifu	
57	Radon Emanation Techniques as an Added Dimension in Site Investigation of Water Storage Facilities	337
	Gary Neil Davis and Mannie Levin	
 Part V Capturing and Communicating Geologic Variability and Uncertainty		
58	Improving Geotechnical Uncertainty Evaluation in Reliability-Based Design	343
	Fred H. Kulhawy	
59	Communicating Geological Uncertainty: The Use of the Conceptual Engineering Geological Model	347
	Christopher Jack and Steve Parry	
60	Evaluating the Effects of Input Cost Surface Uncertainty on Deep-Water Petroleum Pipeline Route Optimization	351
	William C. Haneberg	
61	Scanline Sampling Techniques for Rock Engineering Surveys: Insights from Intrinsic Geologic Variability and Uncertainty	357
	Helder I. Chaminé, Maria José Afonso, Luís Ramos, and Rogério Pinheiro	
62	A Suggested Geologic Model Complexity Rating System	363
	Jeffrey R. Keaton	
63	Managing Uncertainty in Geological Engineering Models for Open-Pit Feasibility	367
	Rosalind Munro and Jeffrey R. Keaton	
 Part VI Construction in Complex Geological Settings—The Problematic of Predicting the Nature of the Ground		
64	Engineering Geological and Geotechnical Cartographic Modeling as a Methodological Basis for Engineering Surveys and Design in Complex Geological Environment	373
	Felix Rivkin, I. Kuznetsova, A. Popova, I. Parmuzin, and I. Chehina	
65	Experiences Learned from Engineering Geological Investigation of Headrace Tunnel on Sedimentary Rock—Xekaman3 Hydropower Project—Lao PDR	377
	Nguyen Song Thanh and Dao Dang Minh	
66	Engineering Properties of Badlands in the Canadian Prairies	381
	Khan Fawad and Azam Shahid	

67	Case Studies of Post Investigation Geological Assessments: Hunter Expressway	387
	David J. Och, Robert Kingsland, Sudar Aryal, Henry Zhang, and Geoff Russell	
68	Contribution to the Behavior Study and Collapse Risk of Underground Cavities in Highly Saline Geological Formations	393
	Mohamed Chikhaoui, Ammar Nechnech, Dashnor Hoxha, and Kacem Moussa	
69	Seabed Properties for Anchoring Floating Structures in the Portuguese Offshore	399
	Joaquim Pombo, Aurora Rodrigues, and A. Paula F. da Silva	
70	Model of Permafrost Thaw Halo Formation Around a Pipeline.	405
	Pavel Novikov, Elizaveta Makarycheva, and Valery Larionov	
71	Assessing Rock Mass Properties for Tunnelling in a Challenging Environment. The Case of Pefka Tunnel in Northern Greece	409
	Vassilis Marinos, George Prountzopoulos, Petros Fortsakis, Fragkiskos Chrysochoidis, Konstantinos Seferoglou, Vassilis Perleros, and Dimitrios Sarigiannis	
72	Prediction of RMR Ahead Excavation Front in D&B Tunnelling	415
	Vítor Santos, A. Paula F. da Silva, and M. Graça Brito	
73	The Medium- to Long-Term Effects of Soil Liquefaction in the Po Plain (Italy)	421
	Elio Bianchi, Lisa Borgatti, and Luca Vittuari	
 Part VII Engineering Geological Problems in Deep Seated Tunnels		
74	Leaching Characteristics of Heavy Metals from Mineralized Rocks Located Along Tunnel Construction Sites.	429
	Nohara Yokobori, Toshifumi Igarashi, and Tetsuro Yoneda	
75	Hydrogeological Controls on the Swelling of Clay-Sulfate Rocks in Tunneling.	435
	Christoph Butscher	
76	Geomechanical Characterisation of Hard Rocks for Disc Cutting in Deep Tunnels	439
	Marlène C. Villeneuve	
77	Geotechnical Design of an Underground Mine Dam in Gyöngyösoroszi, Hungary	443
	Vendel Józsa, Zoltán Czap, and Balázs Vásárhelyi	
78	An Approach on the Types and Mechanisms of Water Inrush in Traffic Tunnel Constructions in China.	449
	Li Tianbin, Zuo Qiankun, Meng Lubo, and Xue Demin	

79	Numerical Analysis of the Influence of Tunnel Dimensions on Stress and Deformation Around Tunnels in Rocks	453
	G.E. Ene, C.T. Davie, and C.O. Okogbue	
80	Analysis of Stress Conditions at Deep Seated Tunnels—A Case Study at Brenner Base Tunnel	459
	Johanna Patzelt and Kurosch Thuro	
81	Acoustic Emission Technique to Detect Micro Cracking During Uniaxial Compression of Brittle Rocks.	465
	Carola Wieser, Heiko Käsling, Manuel Raith, Ronald Richter, Dorothee Moser, Franziska Gemander, Christian Grosse, and Kurosch Thuro	
82	Towards a Uniform Definition of Rock Toughness for Penetration Prediction in TBM Tunneling	469
	Lisa Wilfing, Heiko Käsling, and Kurosch Thuro	
83	Stability Analysis of Accidental Blocks in the Surrounding Rockmass of Tunnels in Zipingpu Hydroelectric Project.	475
	Yanna Yang, Mo Xu, Shuqiang Lu, and Hong Liu	
 Part VIII Engineering Geological Problems Related to Geological Disposal of High-level Nuclear Waste		
84	Feasible Study of the Siting of China's High-Level Radioactive Waste Repository in an Area of Northwest China.	483
	Yuan Gexin, Zhao Zhenhua, Chen Jianjie, Jia Mingyan, Han Jimin, and Gao Weichao	
85	A New Apparatus for the Measurement of Swelling Pressure Under Constant Volume Condition.	489
	C.S. Tang, A.M. Tang, Y.J. Cui, P. Delage, and E. De Laure	
86	2D and 3D Thermo-Hydraulic-Mechanical Analysis of Deep Geologic Disposal in Soft Sedimentary Rock	493
	Feng Zhang and Yonglin Xiong	
87	Anisotropy in Oedometer Test on Natural Boom Clay	499
	Linh-Quyen Dao, Yu-Jun Cui, Anh-Minh Tang, Pierre Delage, Xiang-Ling Li, and Xavier Sillen	
88	The OECD/NEA Report on Self-sealing of Fractures in Argillaceous Formations in the Context of Geological Disposal of Radioactive Waste.	503
	Helmut Bock	
89	Permeability and Migration of Eu(III) in Compacted GMZ Bentonite-Sand Mixtures as HLW Buffer/Backfill Material	507
	Zhang Huyuan, Yan Ming, Zhou Lang, and Chen Hang	

90	Correlative Research on Permeability and Microstructure of Life Source Contaminated Clay	511
	Liwen Cao, Yong Wang, Pan Huo, Zhao Sun, and Xuezhe Zhang	
91	Diffusion of La^{3+} in Compacted GMZ Bentonite Used as Buffer Material in HLW Disposal	515
	Yonggui Chen, Lihui Niu, Yong He, Weimin Ye, and Chunming Zhu	
92	Soil Mechanics of Unsaturated Soils with Fractal-Texture.	519
	Yongfu Xu and Ling Cao	
93	Thermal Effects on Chemical Diffusion in Multicomponent Ionic Systems	525
	Hywel R. Thomas and Majid Sedighi	
94	Unsaturated Hydraulic Conductivity of Highly Compacted Sand-GMZ01 Bentonite Mixtures Under Confined Conditions.	529
	W.M. Ye, Wei Su, Miao Shen, Y.G. Chen, and Y.J. Cui	
95	Adsorption, Desorption and Competitive Adsorption of Heavy Metal Ions from Aqueous Solution onto GMZ01 Bentonite.	533
	W.M. Ye, Yong He, Y.G. Chen, Bao Chen, and Y.J. Cui	
96	Enhanced Isothermal Effect on Swelling Pressure of Compacted MX80 Bentonite	537
	Snehasis Tripathy, Ramakrishna Bag, and Hywel R. Thomas	
97	Effects of Stress and Suction on the Volume Change Behaviour of GMZ Bentonite During Heating	541
	Wei-Min Ye, Qiong Wang, Ya-Wei Zhang, Bao Chen, and Yong-Gui Chen	
98	Preliminary Assessment of Tunnel Stability for a Radioactive Waste Repository in Boom Clay	545
	P. Arnold, P.J. Vardon, and M.A. Hicks	
99	Measurements of Acoustic Emission and Deformation in a Repository of Nuclear Waste in Salt Rock	551
	Jürgen Hesser, Diethelm Kaiser, Heinz Schmitz, and Thomas Spies	
 Part IX Engineering Geology and Design of Hydroelectric Power Plants		
100	Construction of the Underground Powerhouse at Dagachhu Hydropower Project, Bhutan.	557
	Reinhold Steinacher and Gyeltshen Kuenga	
101	The Influence of Microbiological Processes on Subsurface Waters and Grounds in River Dam Basement	563
	N.G. Maksimovich and V.T. Khmurchik	

102	Factors Controlling the Occurrence of Reservoir-Induced Seismicity	567
	Xin Qiu and Clark Fenton	
103	Condition of Boguchany Concrete Dam Foundation According to Instrumental Observations	571
	E.S. Kalustyan and V.K. Vavilova	
104	Study on Reservoir and Water Inrush Characteristic in Nibashan Tunnel, Sichuan Province, China	577
	Sixiang Ling, Yong Ren, Xiyong Wu, Siyuan Zhao, and Limao Qin	
105	Differential Settlement Control Technologies of the Long Submarine Tunnel Covered by Municipal Road	583
	Cuiying Zhou and Zhen Liu	
106	Chontal HPP, Geological Features on Site Location and Dam Type.	591
	Cristina Accotto, Giuseppe Favata, Enrico Fornari, Nikolaos Kazilis, Marco Rolando, and Attilio Eusebio	
 Part X Geological Model in Major Engineering Projects		
107	Evaluation of Geological Model in Construction Process of Sabzkuh Tunnel (Case Study in Iran)	599
	Majid Taromi, Abbas Eftekhari and Jafar Khademi Hamidi	
108	Geological Design for Complex Geological-Structural Contest: The Example of SS 125 “Nuova Orientale Sarda”	611
	Serena Scarano, Roberto Laureti and Stefano Serangeli	
109	The “A12—Tor dè Cenci” Motorway: Geological Reference Model and Design Solutions in Presence of Soft Soils	617
	Stefano Serangeli, Roberto Laureti, and Serena Scarano	
110	The Geological Reference Model for the Feasibility Study of the Corredor Bioceanico Aconcagua Base Tunnel (Argentina-Chile Trans-Andean Railway).	623
	Marini Mattia, Mancari Giuseppe, Damiano Antonio, Alzate Marta, and Stra Michel	
111	UHE Belo Monte: Geological and Geomechanical Model of Intake Foundation of Belo Monte Site	627
	Jose Henrique Pereira and Nicole Borchardt	
112	Geological Reference Model in the Design of the SS 182 “Trasversale Delle Serre”: Ionian Calabria	633
	Roberto Laureti, Serena Scarano, and Stefano Serangeli	

Part XI Impacts of Environmental Hazards to Critical Infrastructures

- 113 The Vulnerability Shadow Cast by Debris Flow Events 641**
M.G. Winter
- 114 Active Faults at Critical Infrastructure Sites: Definition, Hazard
Assessment and Mitigation Measures 645**
Alexander Strom
- 115 Foundation Damage Responses of Concrete Infrastructure in
Railway Tunnels Under Fatigue Load 649**
L.C. Huang and G. Li
- 116 Assessment and Risk Management for Integrated Water Services 653**
Loretta Gnani, Glenda Taddia, and Stefano Lo Russo
- 117 Multi-risk Assessment of Cuneo Province Road Network 657**
Murgese Davide, Giraudo Giorgio, Testa Daniela, Airolti Giulia,
Cagna Roberto, Bugnano Mauro, and Castagna Sara
- 118 Superficial Hollows and Rockhead Anomalies in the London Basin,
UK: Origins, Distribution and Risk Implications for Subsurface
Infrastructure and Water Resources 663**
Philip E.F. Collins, Vanessa J. Banks,
Katherine R. Royse, and Stephanie H. Bricker
- 119 Analysis of the Interaction Between Buried Pipelines and Slope
Instability Phenomena. 667**
Lisa Borgatti, Alessandro Marzani, Cecilia Spreafico Margherita,
Gilberto Bonaga, Luca Vittuari, and Francesco Ubertini
- 120 The Importance of Rockfall and Landslide Risks
on Swiss National Roads 671**
Philippe Arnold and Luuk Dorren

Part XII Innovative Methods in Characterization and Monitoring of Geotechnical Structures

- 121 TLS Based Determination of the Orientation of Discontinuities in
Karstic Rock Masses. 679**
Th. Mutschler, D. Groeger, and E. Richter
- 122 Characterization of the Dagorda Claystone in Leiria, Portugal, Based
on Laboratory Tests 685**
A. Veiga and M. Quinta-Ferreira
- 123 Acoustic Monitoring of Underground Instabilities in an Old
Limestone Quarry. 689**
Cristina Occhiena, Charles-Edouard Nadim, Arianna Astolfi,
Giuseppina Emma Puglisi, Louena Shtrepi, Christian Bouffier,
Marina Pirulli, Julien de Rosny, Pascal Bigarré, and Claudio Scavia

124	Investigative Procedures for Assessing Subsidence and Earth Fissure Risk for Dams and Levees.	695
	Kenneth C. Fergason, Michael L. Rucker, Bibhuti B. Panda, and Michael D. Greenslade	
125	An Integrated Approach for Monitoring Slow Deformations Preceding Dynamic Failure in Rock Slopes: A Preliminary Study	699
	Chiara Colombero, Cesare Comina, Anna Maria Ferrero, Giuseppe Mandrone, Gessica Umili, and Sergio Vinciguerra	
126	Combining Finite-Discrete Numerical Modelling and Radar Interferometry for Rock Landslide Early Warning Systems	705
	Francesco Antolini and Marco Barla	
127	A Tool for Semi-automatic Geostructural Survey Based on DTM	709
	Sabrina Bonetto, Anna Facello, Anna Maria Ferrero, and Gessica Umili	
128	New Perspectives in Long Range Laser Scanner Survey Focus on Structural Data Treatment to Define Rockfall Susceptibility	715
	Andrea Filipello, Leandro Bornaz, and Giuseppe Mandrone	
129	Structural Data Treatment to Define Rockfall Susceptibility Using Long Range Laser Scanner	721
	Andrea Filipello, Giuseppe Mandrone, and Leandro Bornaz	
130	Artificial Neural Networks in Evaluating Piezometric Levels at the Foundation of Itaipu Dam.	725
	Bruno Medeiros, Lázaro Valentin Zuquette, and Josiele Patias	
131	Use of an Advanced SAR Monitoring Technique to Monitor Old Embankment Dams.	731
	Giovanni Nico, Andrea Di Pasquale, Marco Corsetti, Giuseppe Di Nunzio, Alfredo Pitullo, and Piernicola Lollino	
132	Modelling and Optimization of the Biological Treatment in the Conception of Water-Treatment Plants Whith Activated Sludge	739
	Moncef Chabi and Yahia Hammar	
 Part XIII Large Projects Impact Assessment, Mitigation and Compensation		
133	Mining with Filling for Mitigating Overburden Failure and Water Inrush Due to Coalmining.	749
	Wanghua Sui, Gailing Zhang, Zhaoyang Wu, and Dingyang Zhang	
134	Empirical Cutting Tool Wear Prognosis for Hydroshield TBM in Soft Ground	753
	Florian Köppl, Kuroschi Thuro, and Markus Thewes	
135	Risk and Mitigation of the Large Landslide of Brindisi di Montagna . . .	757
	Giuseppe Spilotro, Filomena Canora, Roberta Pellicani, and Francesco Vitelli	

136	Environmental Impact of a Motorway Tunnel Project on an Important Karst Aquifer in Southern Latium Region: The Case of Mazzoccolo Spring (Formia, Italy)	761
	Giuseppe Sappa, Flavia Ferranti, and Sibel Ergul	
 Part XIV Properties and Behaviour of Weak and Complex Rock Masses in Major Engineering Projects		
137	Rock Mass Quality Rating (RMQR) System and Its Application to the Estimation of Geomechanical Characteristics of Rock Masses	769
	Ömer Aydan, Resat Ulusay, and N. Tokashiki	
138	Investigation and Treatment of Problematic Foundations for Storage Dams: Some Experience	773
	Wynfrith Riemer and rer nat	
139	Dissolution Influences on Gypsum Rock Under Short and Long-term Loading: Implications for Dams	779
	Nihad B. Salih, Philip E.F. Collins, and Stephen Kershaw	
140	Underground Works in Weak and Complex Rock Mass and Urban Area	785
	Serratrice Jean François	
141	A Dam with Floating Foundations	789
	Vinod Kumar Kasliwal	
142	Classification of “Loosened Rock Mass” Based on Cases of Dam Construction.	793
	Takahiro Eguchi, Katsuhito Agui, and Yasuhito Sasaki	
143	Numerical Analysis of a Crossover Cavern Excavated in a Complex Rock Mass as Part of the Hong Kong Express Rail Link Project	799
	D.K. Koungelis and R. Lyall	
144	The Influence of Geological History on Preferred Particle Orientation and the Observed Anisotropy of Over Consolidated UK Mudrocks	805
	Stephen Wilkinson and Clark Fenton	
145	Mechanical Characterization of Weathered Schists.	809
	Thomas Le Cor, Damien Rangeard, Véronique Merrien-Soukatchoff, and Jérôme Simon	
146	Deformation of Soil and Rock Transition Belt Caused by the Mining Damage	813
	Qinghong Dong, Fei Liu, and Qiang Zhang	
147	Geomechanical Assessment on a Metasedimentary Rock Cut Slope (Trofa, NW Portugal): Geotechnical Stability Analysis	819
	M.J. Afonso, R.S. Silva, P. Moreira, J. Teixeira, H. Almeida, J.F. Trigo, and H.I. Chaminé	

148	Geomechanical Characterization of a Weak Sedimentary Rock Mass in a Large Embankment Dam Design	825
	Gian Luca Morelli and Ezio Baldovin	
149	Experimental Study of Anisotropically Mechanical Features of Phyllite and Its Engineering Effect.	831
	Meng Lubo and Li Tianbin	
150	Quantification of Rock Joint Roughness Using Terrestrial Laser Scanning.	835
	Maja Bitenc, D. Scott Kieffer, Kourosh Khoshelham, and Rok Vežočník	
151	Elaboration and Interpretation of Ground Investigation Data for the Heterogeneous ‘Athens Schist’ Formation; from the ‘Lithological Type’ to the ‘Engineering Geological Formation’	839
	Georgios Stoumpos and Konstantinos Boronkay	
152	Incorporating Variability and/or Uncertainty of Rock Mass Properties into GSI and RMI Systems Using Monte Carlo Method	843
	Mehmet Sari	
153	Using of Multivariate Statistical Analysis in Engineering Geology at the Pest Side of the Metro Line 4 in Budapest, Hungary.	851
	Nikolett Bodnár, József Kovács, and Ákos Török	
154	Evaluation of the Swelling Pressure of the Corumbatai Formation Materials	855
	R.F.C. Souza and O.J. Pejon	
155	Classification of Weak Rock Masses in Dam Foundation and Tunnel Excavation	859
	V. Marinos, P. Fortsakis, and G. Stoumpos	
156	Applicability of Weathering Classification to Quartzitic Materials and Relation Between Mechanical Properties and Assigned Weathering Grades: A Comparison with Investigations on Granitic Materials	865
	A. Basu	
157	Performance of Forepole Support Elements Used in Tunnelling Within Weak Rock Masses	869
	J. Oke and N. Vlachopoulos	
158	The Research of Shear Creep Behaviors of Saturated Sericite-Quartz Phyllite.	875
	Guang Ming Ren, Xin lei Ma, Bo Wen Ren, and Min Xia	

Part XV Radioactive Waste Disposal: An Engineering Geological and Rock Mechanical Approach

- 159 Investigation of Mineral Deformation and Dissolution Problems Under Various Temperature Conditions.** 883
J.H. Choi, B.G. Chae, C.M. Jeon, and Y.S. Seo
- 160 Analysis of Permeability Coefficient Along a Rough Fractures Using a Homogenization Method.** 887
Chae Byung-Gon, Choi Jung Hae, Seo Yong-Seok, and Woo Ik
- 161 In Situ Quantification of Hydrocarbon in an Underground Facility in Tight Salt Rock** 893
Benjamin Paul, Hua Shao, Jürgen Hesser, and Christian Lege
- 162 Relationship Between the Fractal Dimension and the Rock Mass Classification Parameters in the Bábaapáti Radioactive Waste Repository** 897
Rita Kamera, Balázs Vásárhelyi, László Kovács, and Tivadar M. Tóth
- 163 Direct Shear Strength Test on Opalinus Clay, a Possible Host Rock for Radioactive Waste.** 901
Buocz Ildikó, Török Ákos, Zhao Jian, and Rozgonyi-Boissinot Nikolett
- 164 Significance of Joint Pattern on Modelling of a Drill and Blast Tunnel in Crystalline Rock** 905
Dániel Borbély, Tamás Megyeri, and Péter Görög
- 165 Special Requirements for Geotechnical Characterization of Host Rocks and Designing of a Radioactive Waste Repository** 909
László Kovács and Balázs Vásárhelyi
- 166 Rock Mechanical and Geotechnical Characterization of a Granitic Formation Hosting the Hungarian National Radioactive Waste Repository at Bábaapáti.** 915
László Kovács, Eszter Mészáros, and Gábor Somodi

Part XVI Subsurface Water in Tunnels: Prediction, Estimation, Management

- 167 Ground Water Management for Large Under-Ground Storage Caverns** 921
Saikat Pal, G. Kannan, Vijay Shahri, and A. Nanda
- 168 Experience from Investigation of Tectonically Extremely Deteriorated Rock Mass for the Highway Tunnel Višňové, Slovakia** 927
Rudolf Ondrášik, Antonín Matejček, and Tatiana Durmeková

169	Verification and Validation of Hydraulic Packer Test Results in a Deep Lying Tunnel Project	931
	Ulrich Burger, Paolo Perello, Sacha Reinhardt, and Riccardo Torri	
170	Change in Hydraulic Properties of Rock Mass Due to Tunnelling	937
	Bernard Millen, Giorgio Höfer-Öllinger, and Johann Brandl	
171	Groundwater Ingress in Head Race Tunnel of Tapovan: Vishnugad Hydroelectric Project in Higher Himalaya, India	941
	P.C. Nawani	
172	Investigation Constraints in Subsurface Water Aspect of Hydropower Development in the Indian Himalaya	947
	Y.P. Sharda and Yogendra Deva	
173	Prediction and Management of Ground Water for Underground Works in Himalayas	955
	Akhila Nath Mishra and S. Kannan	
 Part XVII Sustainable Water Management in Tunnels		
174	Methodological Approach for the Valorisation of the Geothermal Energy Potential of Water Inflows Within Tunnels	963
	Riccardo Torri, Nathalie Monin, Laudo Glarey, Antonio Dematteis, Lorenzo Brino, and Elena Maria Parisi	
175	Impacts on Groundwater Flow Due to the Excavation of Artificial Railway Tunnels in Soils	967
	Gabriele Bernagozzi, Gianluca Benedetti, Francesca Continelli, Cristiano Guerra, Renato Briganti, Santo Polimeni, Giuseppe Riggi, and Fabio Romano	
176	Chemical and Isotope Composition of Waters from Firenzuola Railway Tunnel, Italy	971
	L. Ranfagni, F. Gherardi, and S. Rossi	
177	Hydrogeological Modeling Applications in Tunnel Excavations: Examples from Tunnel Excavations in Granitic Rocks	975
	Baietto Alessandro, Burger Ulrich, and Perello Paolo	
178	Effects on the Aquifer During the Realization of Underground Railway Works in Turin	981
	Stefano Ciufegni, Fabrizio Bianco, Adriano Fiorucci, Barbara Moitre, Massimiliano Oppizzio, and Francesco Sacchi	
179	Proposal for Guidelines on Sustainable Water Management in Tunnels	985
	Antonio Dematteis	

Part XVIII Uncertainty and Risk in Engineering Geology

180 The Design Geological and Geotechnical Model (DGGM) for Long and Deep Tunnels.	991
Alessandro Riella, Mirko Vendramini, Attilio Eusebio, and Luca Soldo	
181 Research on Overall Risk Assessment and Its Application in High Slope Engineering Construction.	995
Tao Lianjin, An Junhai, Li Jidong, and Cai Dongming	
182 The Research of Geological Forecast Based on Muti-source Information Fusion	1001
S. Cui, B. Zhang, F. Feng, and L. Xie	
183 Presentation of the Activity of the AFTES WG 32: Considerations Concerning the Characterization of Geotechnical Uncertainties and Risks for Underground Projects.	1007
G.W. Bianchi, J. Piraud, A.A. Robert, E. Egal, and L. Brino	
184 Development of 3D Models for Determining Geotechnical-Geological Risk Sharing in Contracts—Dores de Guanhões/MG/Brazil Hydroelectric Powerplant Case Study	1013
Isabella Figueira, Laurenn Castro, Luiz Alkimin de Lacerda, Amanda Jarek, Rodrigo Moraes da Silveira, and Priscila Capanema	
185 Use of Rock Mass Fabric Index in Fuzzy Environment for TBM Performance Prediction.	1019
Mansour Hedayatzadeh and Jafar Khademi Hamidi	
186 The Risk Analysis Applied to Deep Tunnels Design—El Teniente New Mine Level Access Tunnels, Chile	1023
Lorenzo Paolo Verzani, Giordano Russo, Piergiorgio Grasso, and Agustín Cabañas	
187 Development of Measurement System of Seismic Wave Generated by the Excavation Blasting for Evaluating Geological Condition Around Tunnel Face	1031
Masashi Nakaya, Kazuhiro Onuma, Hiroyuki Yamamoto, Shinji Utsuki, and Hiroaki Niitsuma	
188 Multidisciplinary Methodology Used to Detect and Evaluate the Occurrence of Methane During Tunnel Design and Excavation: An Example from Calabria (Southern Italy).	1035
S. Lombardi, S. Bigi, S. Serangeli, M.C. Tartarello, L. Ruggiero, S.E. Beaubien, P. Sacco, and D. De Angelis	
189 Combined Geophysical Survey at the A2 Tunnel Maastricht.	1039
O. Brenner and D. Orlowsky	

190	The Combined Use of Different Near Surface Geophysics Techniques and Geotechnical Analysis in Two Case Histories for the Advanced Design of Underground Works in Urban Environment: Rome Metro B and Torino-Ceres Railway	1045
	Riccardo Enrione, Simone Cocchi, and Mario Naldi	
191	Landslides Induced by Intense Rainfall and Human Interventions—Case Studies in Algeria.	1049
	Ramdane Bahar, Omar Sadaoui, and Samir Sadaoui	
 Part XIX Physical Impacts to the Environment of Infrastructure Development Projects – Engineering Geology Data for Environmental Management		
192	Using of Man-Made Massives in Russian Mining (Engineering: Geological Aspects)	1057
	Galperin Anatoly	
193	Modeling Optimized UCG Gas Qualities and Related Tar Pollutant Production Under Different Field Boundary Conditions	1063
	Stefan Klebingat, Rafiq Azzam, Marc Schulten, Thomas Kempka, Ralph Schlüter, and Tomás M. Fernández-Steeger	
194	Considerations About the Integration of Geological and Geotechnical Studies Applied to Engineering Projects and to Environmental Impact Assessment in São Paulo State, Brazil.	1067
	Bitar Omar Yazbek, Sofia Julia A.M. Campos, Amarilis Lucia C.F. Gallardo, Braga Tania de Oliveira, and Caio Pompeu Cavallieri	
195	Integrated Geological, Geotechnical and Hydrogeological Model Applied to Environmental Impact Assessment of Road Projects in Brazil	1071
	Sofia Julia A.M. Campos, Adalberto Aurelio Azevedo, Amarilis Lucia F.C. Gallardo, Pedro Refinetti Martins, Lauro Kazumi Dehira, and Alessandra Gonçalves Siqueira	
	Author Index	1077

Engineering Geology for Society and Territory - Volume
6

Applied Geology for Major Engineering Projects

Lollino, G.; Giordan, D.; Thuro, K.; Carranza-Torres, C.;

Wu, F.; Marinos, P.; Delgado, C. (Eds.)

2015, XXVII, 1082 p. 706 illus., 517 illus. in color. In 2
volumes, not available separately., Hardcover

ISBN: 978-3-319-09059-7