

# **24th European Meeting of Environmental and Engineering Geophysics 2018**

Held at Near Surface Geoscience Conference and Exhibition  
2018

Porto, Portugal  
9 - 13 September 2018

Volume 1 of 2

ISBN: 978-1-5108-7675-0

**Printed from e-media with permission by:**

Curran Associates, Inc.  
57 Morehouse Lane  
Red Hook, NY 12571



**Some format issues inherent in the e-media version may also appear in this print version.**

Copyright© (2018) by the European Association of Geoscientists & Engineers (EAGE)  
All rights reserved.

Printed by Curran Associates, Inc. (2019)

For permission requests, please contact by the European Association of Geoscientists & Engineers (EAGE)  
at the address below.

European Association of Geoscientists & Engineers (EAGE)  
PO Box 59  
3990 DB Houten  
The Netherlands

Phone: +31 88 995 5055  
Fax: +31 30 634 3524

[eage@eage.org](mailto:eage@eage.org)

**Additional copies of this publication are available from:**

Curran Associates, Inc.  
57 Morehouse Lane  
Red Hook, NY 12571 USA  
Phone: 845-758-0400  
Fax: 845-758-2633  
Email: [curran@proceedings.com](mailto:curran@proceedings.com)  
Web: [www.proceedings.com](http://www.proceedings.com)

# TABLE OF CONTENTS

## VOLUME 1

|  |    |
|--|----|
| <b>MODERN ELECTRO-PROSPECTING TECHNOLOGIES FOR SEARCHING AND EXPLORATION OF ORE DEPOSITS</b> .....   | 1  |
| <i>S. Zaytsev</i>  |    |
| <b>INFLUENCE OF THE GROUND SURFACE RELIEF ON THE RESULTS OF ELECTRICAL TOMOGRAPHY</b> .....  | 6  |
| <i>T. Mirgalikzy</i>   |    |
| <b>SUNNYSIDE DEPOSIT: A CALIBRATION SITE FOR AIRBORNE EM SYSTEMS</b> .....   | 11 |
| <i>A. Vezzoli, A. Menghini, G. Selfe, V. Kaminsky</i>  |    |
| <b>POSSIBILITY OF DISTRIBUTED ACOUSTIC SENSING (DAS) FOR GEOPHYSICAL PROBLEMS SOLUTION</b> .....   | 17 |
| <i>A. Shuvalov</i>   |    |
| <b>DIFFERENT SCALE COMPLEX AIRBORNE GEOPHYSICAL SURVEY IN THE CENTRAL AFRICAN RIDGE AREA</b> .....   | 22 |
| <i>E. Moilanen</i>   |    |
| <b>COMPLEX OF GEOPHYSICAL METHODS DURING THE SURVEY OF THE UNDERWATER DIAPIR VOLCANO OF THE TAMAN PENINSULA</b> .....  | 27 |
| <i>A. V. Kozlova, D. A. Korshunov, T. S. Klapysheva</i>  |    |
| <b>ASSESSMENT OF THE STATE OF STABILITY OF A ROAD TUNNEL ON THE BASIS OF DATA FROM A MULTILEVEL SEISMIC SURVEY</b> .....                                       | 32 |
| <i>V. Pisetsky, A. Zudilin, S. Chevdar</i>   |    |
| <b>ENGINEERING-GEOLOGICAL CONDITIONS FOR CONSTRUCTION OF HIGHWAYS IN THE CRYOLITHOZONE</b> .....   | 37 |
| <i>I. Abaturova, I. Koroleva, I. Savintsev, L. Storozhenko, I. Kovyazin</i>  |    |
| <b>MULTIPLE, CONCURRENT GPR DATA ACQUISITION - THE WARR MACHINE</b> .....  | 43 |
| <i>N. Diamanti, A. P. Annan</i>  |    |
| <b>APPLICATION OF THE SMALL-LOOP TDEM METHOD TO THE QUANTIFICATION OF BOTH ELECTRICAL AND MAGNETIC PARAMETERS OF THE SUBSURFACE (NUMERICAL APPROACH)</b> ..... | 45 |
| <i>C. Finco, C. Schamper, F. Rejiba</i>  |    |
| <b>SEDIMENT VOLUME SEARCH SONAR</b> .....  | 47 |
| <i>T. E. Blanford, D. C. Brown, S. F. Johnson, C. F. Brownstead</i>  |    |
| <b>INTEGRATING MULTIPLE GEOPHYSICAL METHODS TO UNDERSTAND GROUNDWATER STORAGE AND DISCHARGE IN TROPICAL PROGLACIAL CATCHMENTS</b> .....                        | 49 |
| <i>R. Glas, L. Lautz, J. McKenzie, R. Moucha, B. Mark</i>  |    |
| <b>VARIABILITY OF ELECTRICAL CONDUCTIVITY AND WATER CONTENT IN A SOIL UNDER IRRIGATION IN THE PAMPEAN REGION, ARGENTINA</b> .....                              | 51 |
| <i>C. M. Sainato, M. S. Iseas, J. J. Márquez Molina</i>  |    |
| <b>ELECTRICAL RESISTIVITY SURVEY TO LOCATE BURIED COLONIAL STRUCTURES IN THE SANTO DOMINGO'S HISTORIC COMPLEX, PANAMA</b> .....                                | 56 |
| <i>M. Lezcano, A. Mojica, G. Arosemena, F. Durán, C. Ho, M. Llubes, L. Pastor, C. Camerlynck, F. Réjiba</i>  |    |
| <b>A MULTIDISCIPLINARY STUDY OF SOILS FROM THE SHA'AR HA-GOLAN (ISRAEL) AS A METHOD FOR DETERMINING ANCIENT HUMAN ACTIVITY</b> .....                           | 61 |
| <i>S. Itkis, L. Bityukova</i>  |    |
| <b>CAN MAGNETOMETRY DETECT SEDIMENT-FILLED CAVES? THE CASE STUDY OF THE SIERRA DE ATAPUERCA SITES (BURGOS, SPAIN)</b> .....                                    | 66 |
| <i>L. Bermejo, A. I. Ortega, J. Thiesson, J. M. Parés, R. Guérin, I. Campaña, J. M. Bermúdez De Castro, E. Carbonell</i>                                       |    |
| <b>DIGITAL MUSEUM FROM INTEGRATED 3D AERIAL PHOTOGRAMMETRY, LASER SCANNER AND GEOPHYSICS DATA</b> .....  | 71 |
| <i>G. Ranieri, A. Trogu, F. Loddo, L. Piroddi, M. Cogoni</i>   |    |
| <b>AUTOMATIC ERT MONITORING SYSTEM INSTALLATION AT CRATER LAKE, DECEPTION ISLAND, ANTARCTICA</b> .....   | 76 |
| <i>M. Farzamian, G. Vieira, F. Monteiro Santos, B. Yaghoobi Tabar, C. Hauck, M. Catarina Paz, I. Bernando, M. Ramos, M. A. Pablo</i>                           |    |

|   |            |
|---|------------|
| <b>ELECTRICAL RESISTIVITY TOMOGRAPHY OF CELTIC BURIAL MOUNDS IN NONNWEILER (GERMANY).....</b>   | <b>81</b>  |
| <i>O. S. Al-Saadi, V. Schmidt, P. Lendle</i>  |            |
| <b>GEOPHYSICS APPLIED IN PRECISION AGRICULTURE – EXPERIMENTAL RESISTIVITY STUDIES FOR PLANT ROOT DETECTION AND ANALYSIS .....</b>                           | <b>86</b>  |
| <i>A. G. Gereá, A. E. Mihai</i>   |            |
| <b>PARAMETRIC STUDY OF GPR SIGNALS NUMERICAL MODEL TO ANALYZE HARDENED CONCRETE RESPONSE AT DIFFERENT ANTENNA POSITIONS .....</b>                           | <b>91</b>  |
| <i>I. Rodríguez-Abad, J. Mené-Aparicio, R. Martínez-Sala, Y. Botella</i>  |            |
| <b>GPR PROSPECTING OF FLUVIAL-EOLIAN INTERACTION DEPOSITS IN THE BERMEJO VALLEY, NW ARGENTINA .....</b>   | <b>96</b>  |
| <i>P. Zabala Medina, N. Bonomo, A. M. Osella, S. Salvo Bernárdez, O. Limarino</i>   |            |
| <b>ANALYSIS OF GPR RESPONSE TO CAVITIES SIMULATED IN THE PHYSICAL EXPERIMENTS.....</b>  | <b>101</b> |
| <i>C. Kim, W. Kang, J. Son, S. Jeong, M. J. Nam</i>   |            |
| <b>AUTOMATIC DETECTION OF REFLECTIONS AT ANCIENT WALLS IN SIMPLE-OFFSET GPR IMAGES BY USING CASCADE CLASSIFIERS.....</b>                                    | <b>106</b> |
| <i>P. Bordón, P. Martinelli, N. E. Bonomo</i>   |            |
| <b>GPR SURVEY IN OUTCROPPING OF THE GUARANI AQUIFER SYSTEM, PARANÁ SEDIMENTARY BASIN, BRAZIL - PRELIMINARY RESULTS .....</b>                                | <b>111</b> |
| <i>J. L. Porsani, J. V. Coutinho, B. Poluha, E. Wendland</i>  |            |
| <b>EIGENIMAGE FILTERING ON SUDOEKSA FIELD DATA TO REDUCE CLUTTERS.....</b>  | <b>116</b> |
| <i>J. Hwang, D. Min, D. Kim, Y. Yoo</i>   |            |
| <b>ENHANCING STRATIGRAPHIC AND STRUCTURAL FEATURES IN GPR IMAGES OF LIMESTONE KARST THROUGH ADEQUATE DATA PROCESSING.....</b>                               | <b>121</b> |
| <i>W. E. Medeiros, J. Oliveira Jr., F. Santana, F. Bezerra, C. Cazarin</i>  |            |
| <b>A NEWLY DEVELOPED GPR RECEIVER .....</b>   | <b>126</b> |
| <i>P. Annan, N. Diamanti</i>  |            |
| <b>ANALYSIS OF RANDOM BACKSCATTERING IN GROUND-PENETRATING RADAR SIGNALS TO DETECT SUBTERRANEAN WATERCOURSES - FIELD RESULTS AND LABORATORY TESTS .....</b> | <b>131</b> |
| <i>V. Perez Gracia, Y. Rovira, S. Santos-Assunção</i>   |            |
| <b>DETERMINATION OF ENVIRONMENTAL VULNERABILITY USING GPR DATA .....</b>  | <b>136</b> |
| <i>Z. Plank, D. Polgar, Z. Pronay</i>   |            |
| <b>STUDY OF STRUCTURAL ELEMENTS IN HERITAGE BUILDINGS WITH GROUND PENETRATING RADAR IMAGES.....</b>   | <b>141</b> |
| <i>S. Santos-Assunção, V. Perez-Gracia</i>  |            |
| <b>ENHANCING CROSSHOLE GPR DATA BY ANALYSING TRAVEL TIME DIFFERENCES OF RECIPROCAL TOMOGRAPHIC MEASUREMENTS .....</b>                                       | <b>146</b> |
| <i>S. Hellmann, P. Giertzuch, M. Grab, A. Bauder, H. Maurer</i>   |            |
| <b>DEVELOPMENT OF DRONE-ASSISTED ELECTROMAGNETIC PROSPECTING SYSTEM FOR AUTOMOBILES BURIED BY LANDSLIDES.....</b>   | <b>151</b> |
| <i>Y. Mitsuhashi, T. Ueda, A. Kamimura, S. Kato, A. Takeuchi, C. Aduma</i>  |            |
| <b>ELECTRICAL SOUNDINGS APPLIED TO THE CONTAMINATION AT A FEEDLOT IN BUENOS AIRES PROVINCE, ARGENTINA .....</b>   | <b>156</b> |
| <i>C. M. Sainato, P. Zarragoicoechea, B. N. Losinno</i>   |            |
| <b>ANALYSIS OF SOIL GAS AND THEIR CORRELATION WITH SEISMIC EVENTS ALONG INDO-BURMESE SUBDUCTION ZONE .....</b>  | <b>161</b> |
| <i>R. C. T. Tiwari, S. Singh, H. P. Jaishi, R. P. Tiwari</i>  |            |
| <b>PRELIMINARY ANALYSIS OF STRONG MOTION DATA FROM NEPAL EARTHQUAKE - AN INPUT FOR STRUCTURAL DESIGNING .....</b>   | <b>166</b> |
| <i>M. Dagar</i>   |            |
| <b>EFFECT OF HETEROGENEITY ON ESTIMATION OF PERMEABILITY USING LATTICE BOLTZMANN.....</b>   | <b>171</b> |
| <i>S. Rezaie</i>  |            |
| <b>2D AND 3D INVERSE MODELING OF THE RESIDUAL GRAVITY FIELD FOR A BURIED DEPOSIT MASS.....</b>  | <b>176</b> |
| <i>A. Eshaghzadeh</i>   |            |
| <b>MAGNETOTELLURIC RESPONSES IN LAYERED MEDIUM .....</b>  | <b>181</b> |
| <i>I. V. S. Chanakya, A. Kumar</i>  |            |

|  |            |
|--|------------|
| <b>IMPACT OF SMALL SHEAR WAVE VELOCITY VARIATIONS ON SURFACE WAVE PHASE VELOCITY INVERSION .....</b>                                 | <b>186</b> |
| <i>A. Wang, M. Le Feuvre, D. Leparoux, O. Abraham</i>  |            |
| <b>GEOPHYSICS IN THE PROSPECTING HYDROGEOLOGICAL OF SANTIAGO .....</b>   | <b>191</b> |
| <i>J. Duarte, A. Pina, M. Cunha, F. Figueiredo</i>   |            |
| <b>THE APPLICATION OF ANFIS IN DETERMINING THE OPTIMUM EXPLORATORY BOREHOLES POINTS BY USING EXPLORATORY DATA .....</b>              | <b>196</b> |
| <i>M. Azizi, S. Nourbakhsh Bahreghani, A. Mohammadi</i>  |            |
| <b>ENHANCED INTERPRETATION OF CONTINUOUS DIPMETER LOGS IN FORMATION FRACTURE STUDY .....</b>   | <b>201</b> |
| <i>M. Mavaddat, Y. Mavaddat, M. G. Akbari Fard</i>   |            |
| <b>A COMBINED APPROACH OF ELECTRICAL RESISTIVITY AND PHYSICO-CHEMICAL METHODS FOR MAPPING OF HYDROCARBON CONTAMINATED SITE .....</b> | <b>206</b> |
| <i>K. Ishola, O. Bamidele, K. Oyedele, L. Adeoti</i>   |            |
| <b>FIELD AND LABORATORY VALIDATION OF ERT-DETECTED SUBSURFACE HETEROGENEITY AT THE METER SCALE .....</b>                             | <b>211</b> |
| <i>E. Bloem, A. Dathe, A. Nemes, P. Fernandez, H. K. French, M. Patterson, D. Gimenez</i>  |            |
| <b>MONITORING OF IN SITU REMEDIATION WITH THE DIRECT CURRENT TIME-DOMAIN INDUCED POLARIZATION METHOD .....</b>                       | <b>216</b> |
| <i>A. Nivorlis, T. Dahlin, M. Rossi, H. Wei</i>  |            |
| <b>DIFFERENTIAL ACOUSTIC SPECTROSCOPY FOR LOW FREQUENCY LABORATORY MEASUREMENT OF COMPRESSIBILITY AND ATTENUATION .....</b>          | <b>221</b> |
| <i>J. Harris</i>   |            |
| <b>ANALYSIS OF THE FREQUENCY-TIME CHARACTERISTICS OF SEISMIC AND ELECTROMAGNETIC FIELDS OVER A GAS CONDENSATE FIELD .....</b>        | <b>226</b> |
| <i>V. Potylitsyn, D. Kudinov, G. Shaidurov, E. Kokhonkova, V. Romanov</i>  |            |
| <b>FIRST LAND APPLICATION OF THE DIFFERENTIAL ELECTRICAL DIPOLE METHOD TOGETHER WITH TRANSIENT ELECTROMAGNETICS .....</b>            | <b>231</b> |
| <i>K. Lippert, B. Tezkan, J. Boekmann, A. Haroon</i>   |            |
| <b>FEASIBILITY OF 3D RANDOM SEISMIC ARRAYS FOR SUBSURFACE CHARACTERIZATIONS IN URBAN ENVIRONMENTS .....</b>                          | <b>236</b> |
| <i>B. Brodic, A. Malehmir, M. Svensson, J. Jonsson</i>   |            |
| <b>THREE-DIMENSIONAL AMBIENT NOISE TOMOGRAPHY BASED ON COMMON MIDPOINT SPATIAL AUTOCORRELATION .....</b>                             | <b>241</b> |
| <i>K. Hayashi, C. Konishi</i>  |            |
| <b>A NEW TOWED GROUND-BASED TEM-SYSTEM FOR 3D MAPPING OF THE TOP 50 METERS OF THE SUBSURFACE .....</b>                               | <b>246</b> |
| <i>P. K. Maurya, E. Auken, A. V. Christiansen, N. Foged, T. T. Eiskjær</i>   |            |
| <b>CROSS-HOLE ERT MEASUREMENTS IN SLOTTED PVC CASED BOREHOLES - A NEW PERSPECTIVE IN GEOELECTRICAL PROSPECTION .....</b>             | <b>251</b> |
| <i>A. Almpanis, P. Tsourlos, G. Vargemezis, C. Papazachos</i>  |            |
| <b>ESTIMATION OF ANISOTROPY PARAMETERS IN VTI MEDIA USING THE RAY-BASED TOMOGRAPHY .....</b>   | <b>256</b> |
| <i>G. Bohm</i>   |            |
| <b>SHALLOW CAVERN DETECTION THROUGH THE ACQUISITION AND INTERPRETATION OF AIRBORNE FULL TENSOR GRADIOMETRY .....</b>                 | <b>261</b> |
| <i>A. Morgan, S. Payton, G. Jorgensen, K. Stafford</i>   |            |
| <b>GEOLOGICAL MODELLING IMPLICATIONS - DIFFERENT INVERSION STRATEGIES FROM AEM DATA .....</b>  | <b>266</b> |
| <i>A. Rapiti, F. Jørgensen, A. Menghini, A. Viezzoli, G. Vignoli</i>   |            |
| <b>THE HEAVY MINERAL INDICATOR ADDS A NEW DIMENSION TO AIRBORNE RADIOMETRICS .....</b>   | <b>271</b> |
| <i>I. Hooshyari-Far, A. Kepic, M. Carson</i>   |            |
| <b>A DRONE AS PLATFORM FOR AIRBORNE GAMMA-RAY SURVEYS TO CHARACTERIZE SOIL AND MONITOR CONTAMINATIONS .....</b>                      | <b>276</b> |
| <i>S. Van Der Veeke, R. L. Koomans, F. M. Van Egmond, J. Limburg</i>   |            |
| <b>NEAR SURFACE CONDUCTIVE ZONES IN HESSDALEN VALLEY (NORWAY) INFERRED BY PRELIMINARY VLF SURVEYS .....</b>                          | <b>281</b> |
| <i>G. Vargemezis, J. Zlotnicki, B. Gitle Hauge, A. Kjøniksen, E. Strand</i>  |            |
| <b>GEOPHYSICAL INVESTIGATION OF THE MALGA ARCHAEOLOGICAL PARK (CARTHAGE, TUNISIA) .....</b>  | <b>286</b> |
| <i>A. Jrad, C. Jallouli, Y. Quesnel, P. Rochette</i>   |            |

|  |     |
|--|-----|
| <b>THE ERT-3D METHOD AS A TOOL TO EXPLORE THE PYRAMID OF LA LUNA AND THE MAIN PLAZA SUBSOILS, TEOTHUACAN, MEXICO</b> .....         | 291 |
| <i>R. E. Chavez, A. Tejero Andrade, G. Cifuentes-Nava, J. E. Hernandez-Quintero, D. L. Argote, V. Ortega</i>                       |     |
| <b>SEISMIC SH FULL WAVEFORM INVERSION AS NEW PROSPECTION METHOD IN ARCHAEOGEOPHYSICS</b> .....                                     | 296 |
| <i>D. Koehn, D. Wilken, T. Wunderlich, D. De Nil, W. Rabbel, L. Werther, J. Schmidt, C. Zielhofer, S. Linzen</i>                   |     |
| <b>COMPARISON OF APPARENT CONDUCTIVITY TO GROUND DISPLACEMENT AND SURFICIAL GEOLOGY FOR CONTINUOUS PERMAFROST</b> .....            | 301 |
| <i>G. Oldenborger, N. Short, A. Leblanc</i>  |     |
| <b>SOIL SALINITY ASSESSMENT USING ELECTROMAGNETIC INDUCTION AND INVERSION TECHNIQUE – A CASE STUDY IN PORTUGAL</b> .....           | 306 |
| <i>M. Farzamian, F. A. Monteiro Santos, M. Catarina Paz, M. C. Gonçalves, A. Marta Paz, N. Castanheira, J. Triantafylis</i>        |     |
| <b>EBRO DELTA GEOMETRY AND STRUCTURE CHARACTERIZATION USING THE ELECTRICAL RESISTIVITY IMAGING METHOD</b> .....                    | 311 |
| <i>F. Bellmunt, A. Gabàs, A. Macau, B. Benjumea, S. Figueras</i>   |     |
| <b>KARST IMAGING USING A FUZZY C-MEANS DATA CLUSTERING APPROACH (MONTGRÍ MASSIF, SPAIN)</b> .....                                  | 316 |
| <i>B. Benjumea, A. Gabàs, A. Macau, J. Ledo, F. Bellmunt, S. Figueras</i>  |     |
| <b>STUDY OF SMALL EARTHFILL DAMS STRUCTURE USING SEISMIC REFRACTION, ERT AND SELF-POTENTIAL METHODS</b> .....                      | 321 |
| <i>W. Malagutti Filho, J. C. Dourado, C. A. Moreira, M. M. Coura, F. A. Bergonzoni</i>   |     |
| <b>ELECTRICAL RESISTIVITY METHODS WITH PETROPHYSICAL ANALYSIS OF THEIR RESULTS</b> .....   | 326 |
| <i>D. A. Kvon, V. A. Shevnin, A. A. Ryjov</i>  |     |
| <b>A NOVEL ANALYTICAL APPROACH TO ESTIMATE SAND PRODUCTION IN UNCONSOLIDATED RESERVOIR: CASE STUDY IN OIL FIELD “N”</b> .....      | 331 |
| <i>D. Arianti</i>  |     |
| <b>ANGLE DEPENDANT INTERFERENCE PATTERNS FOR BLAST VIBRATION MINIMIZATION</b> .....  | 336 |
| <i>C. Tauchner, J. Zeiß, F. Bleibinhaus</i>  |     |
| <b>MULTIMETHOD GEOPHYSICAL SURVEY OF A SINKHOLE - THE CASE STUDY OF SÃO MAMEDE</b> .....   | 341 |
| <i>N. Barraca, D. R. Rodrigues, S. Oliveira, F. Almeida, M. Matias</i>   |     |
| <b>APPLICATIONS OF DATA FUSION FOR ESTIMATING WATER SATURATION AT THE BASIS OF SEISMIC, GPR AND RESISTIVITY METHODS</b> .....      | 346 |
| <i>K. Czaja</i>  |     |
| <b>A SEISMIC REFLECTION SIGNAL RECOGNIZING ALGORITHM BASED ON THE STATIONARITY TESTING</b> .....                                   | 351 |
| <i>T. Zhong, Y. Li, B. Yang, S. Zhang</i>  |     |
| <b>CONTRIBUTION OF DEEP DEPOSITS TO ESTIMATE SITE EFFECTS IN THE EAST OF MEXICO CITY</b> .....                                     | 356 |
| <i>D. F. Zepeda Fernández, R. Rojas Hernández, M. Rodríguez</i>  |     |
| <b>MAPPING OF CAVITY USING ELECTRICAL RESISTIVITY TOMOGRAPHY</b> .....   | 361 |
| <i>A. K. Bharati, K. K. K. Singh, A. Prakash, S. K. Pal, A. Verma, P. K. Singh</i>   |     |
| <b>CROSSHOLE SEISMIC TOMOGRAPHY TO ASSESS ROCK MASS FOUNDATION OF DAMS - ALTO CEIRA II DAM CASE STUDY</b> .....                    | 366 |
| <i>R. Mota, M. J. Coelho</i>   |     |
| <b>INTEGRATION OF GEOENGINEERING TECHNIQUES TO MAP HIDDEN QANATS AT SHAHID BAHONAR UNIVERSITY OF KERMAN</b> .....                  | 371 |
| <i>A. Hojat, L. Zanzi, M. H. Loke, H. Ranjbar, S. Karimi-Nasab</i>   |     |
| <b>GEOMETRICAL AND INDUCTION ELECTROMAGNETIC SOUNDINGS RESOLUTION CAPABILITIES FOR GEOLOGICAL ENGINEERING INVESTIGATIONS</b> ..... | 376 |
| <i>I. Mendrii, I. Ingerov, A. Lozoviy</i>  |     |
| <b>HYBRID SURFACE WAVE SURVEY - A COMBINED ACTIVE AND PASSIVE SEISMIC SURVEY USING A LINEAR ARRAY</b> .....                        | 381 |
| <i>T. Inazaki, H. Kisanuki, T. Kita, K. Hayashi</i>  |     |
| <b>HOW TO DETECT DISORDERS DURING TUNNEL DIGGING WITH A MUONS TELESCOPE MOUNTED ON A TBM</b> .....                                 | 386 |
| <i>P. De Sloowere, B. Carlus, A. Chevalier, J.-. Ianigro, J. Marteau, D. Gilbert, M. Rosas-Carbajal</i>                            |     |

|   |            |
|---|------------|
| <b>HOW TO DETECT DENSITY ANOMALIES IN MINING ACTIVITIES WITH COSMIC RAYS<br/>DETECTED BY A MUONS TELESCOPE .....</b>                      | <b>391</b> |
| <i>P. De Sloovere, B. Carlus, A. Chevalier, J.-. Ianigro, J. Marteau, D. Gilbert, M. Rosas-Carbajal</i>                                   |            |
| <b>DETECTION OF BURIED MINE SHAFTS BY GROUND CONDUCTIVITY MAPPING - TWO<br/>EXAMPLES FROM THE WALLOON COALFIELD (BELGIUM) .....</b>       | <b>396</b> |
| <i>N. Dupont, T. Martin, O. Kaufmann</i>  |            |
| <b>GEOPHYSICAL STUDY TO THE PORT OF KOS ISLAND (GREECE) AFTER THE<br/>EARTHQUAKE OF 21ST OF JULY 2017 .....</b>                           | <b>401</b> |
| <i>G. Apostolopoulos, G. Amolochitis, K. Leontarakis, D. Merziotis, D. Karaiskos, A. Kamilakis, A. Stergiou</i>                           |            |
| <b>GEOPHYSICAL AND GEOTECHNICAL DATA FUSION FOR LEVEE ASSESSMENT -<br/>INTERFACE DETECTION WITH BIASED GEOPHYSICAL DATA .....</b>         | <b>406</b> |
| <i>T. Dezert, S. Palma Lopes, Y. Fargier, P. Côte</i>   |            |
| <b>S-WAVE IMAGING OF GLACIAL OVERDEEPEENED ALPINE VALLEYS – MULTI-<br/>COMPONENTS.....</b>  | <b>411</b> |
| <i>T. Burschil, H. Bunness, D. C. Tanner, G. Gabriel</i>  |            |
| <b>INTEGRATED GEOPHYSICAL AND GEOTECHNICAL ANALYSES AT A LANDSLIDE AREA -<br/>CASE HISTORY IN LOPARE, BOSNIA AND HERZEGOVINA.....</b>     | <b>416</b> |
| <i>K. Suto, J. Sugawara, M. Urosevic, S. Arsenovic, S. Komatina</i>   |            |
| <b>NEW GRAVIMETRICAL MAP OF THE RIETI INTRA-MOUNTAIN BASIN (CENTRAL<br/>APENNINES, ITALY) .....</b>                                       | <b>421</b> |
| <i>K. Skrame, M. Di Filippo, M. Di Nezza</i>  |            |
| <b>DEVELOPMENT OF GEOPHYSICAL METHODOLOGIES FOR THE ASSESSMENT OF<br/>COASTAL CONCRETE INFRASTRUCTURES .....</b>                          | <b>426</b> |
| <i>C. Sachet, P. Sentenac, D. Leroux</i>  |            |
| <b>SELECTION OF FIELD PARAMETERS FOR SHALLOW SEISMIC REFLECTION SURVEYING<br/>AND THE RESULTS OF TWO NEW SHALLOW SEISMIC LINES.....</b>   | <b>431</b> |
| <i>J. A. Meekes, V. Vandeweijer</i>   |            |
| <b>THE CONTRIBUTION OF GEOPHYSICAL METHODS TO THE STUDY OF VALLCEBRE<br/>LANDSLIDE (EASTERN PYRENEES, SPAIN).....</b>                     | <b>436</b> |
| <i>M. Himi, M. Sánchez, L. Rivero, R. Lovera, A. Urruela, A. Casas</i>  |            |
| <b>P- AND S-WAVE SEISMIC IMAGING OF SINKHOLE STRUCTURES IN THE CITY OF<br/>HAMBURG.....</b>   | <b>441</b> |
| <i>S. Tschache, U. Polom, H. Bunness, C. M. Krawczyk</i>  |            |
| <b>3D-BOREHOLE RADAR - A ROUTINE TOOL FOR THE DETAILED IMAGING OF SALT<br/>STRUCTURES .....</b>   | <b>446</b> |
| <i>D. Orłowsky, C. Holst, B. Lehmann</i>  |            |
| <b>HIGH-FREQUENCY GPR INVESTIGATIONS IN SAINT VIGILIUS CATHEDRAL, TRENTO.....</b>   | <b>451</b> |
| <i>D. Arosio, A. Hojat, S. Munda, L. Zanzi</i>  |            |
| <b>A FAST GPR NUMERICAL MODEL BASED ON MACHINE LEARNING WITH APPLICATION<br/>TO FULL WAVEFORM INVERSION.....</b>                          | <b>456</b> |
| <i>I. Giannakis, A. Giannopoulos, C. Warren</i>   |            |
| <b>SUBSURFACE UTILITIES MAPPING FOR ENGINEERING APPLICATIONS USING GROUND<br/>PENETRATING RADAR (GPR).....</b>                            | <b>461</b> |
| <i>L. Adeoti, T. Oyeniran, K. Ishola, R. Adegbola, M. Ayuk</i>  |            |
| <b>TREE ROOT IMAGING BY GROUND PENETRATING RADAR SYNCHRONISED WITH SELF-<br/>TRACKING TOTAL STATION.....</b>                              | <b>466</b> |
| <i>K. Takahashi, K. Aoike</i>   |            |
| <b>HYDRAULIC PERMEABILITY PREDICTION FROM INDUCED POLARIZATION DATA AT<br/>FIELD SCALE.....</b>   | <b>471</b> |
| <i>G. Fiandaca, P. K. Maurya, N. Balbarini, A. Hördt, I. Møller, V. Rønne, N. Foged, P. L. Bjerg, A. V. Christiansen, E. Auken</i>        |            |
| <b>HIGH-RESOLUTION SHALLOW SEISMIC INTEGRATED WITH ELECTRICAL RESISTIVITY<br/>METHOD FOR HYDROGEOLOGICAL PROSPECTING.....</b>             | <b>476</b> |
| <i>E. Onyebueke, M. Manzi, R. Durrheim</i>  |            |
| <b>GEOPHYSICAL SURVEYS FOR IMPROVING THE HYDROGEOLOGICAL CONCEPTUAL<br/>MODELS IN THE SEMI-ARID REGION OF VALLE ALTO (BOLIVIA).....</b>   | <b>481</b> |
| <i>A. Gonzales Amaya</i>  |            |
| <b>NEW PROCESSING SCHEMES FOR THE REMOVAL OF HARMONIC NOISE FROM SNMR<br/>SIGNALS IN COMPLEX MULTI-FREQUENCY NOISE ENVIRONMENTS .....</b> | <b>486</b> |
| <i>T. Kremer, J. J. Larsen, F. Nguyen</i>   |            |

|   |     |
|---|-----|
| <b>SUPPLEMENTARY GEOPHYSICAL SURVEY IN URBAN PARK FOR NEW METRO, FÆLLEDPARKEN, COPENHAGEN</b> .....                                 | 491 |
| <i>O. F. Nielsen, K. Martinez</i>   |     |
| <b>ASSESSING THE LINK BETWEEN ELECTROMAGNETIC INDUCTION DATA AND HYDROCARBON POLLUTION AT A FORMER REFINERY IN ROUEN (FR)</b> ..... | 496 |
| <i>L. H. Cavalcante Fraga, F. Rejiba, R. Guérin, C. Schamper</i>  |     |
| <b>GEOPHYSICAL INVESTIGATIONS IN THE VICINITY OF THE KOTALAHTI MINE TAILINGS LANDFILL</b> .....                                     | 501 |
| <i>J. M. Lerssi, T. Huotari</i>   |     |
| <b>SEISMIC IMAGING OF NORTH ANATOLIAN FAULT (NAF) IN THE EASTERN MARMARA REGION, TURKEY</b> .....                                   | 506 |
| <i>N. G. Okut Toksoy, B. Inanç, H. Kurt</i>   |     |

## VOLUME 2

|   |     |
|---|-----|
| <b>A FRACTURE ZONE MASKS A CAVITY FOR SHEAR WAVES</b> .....   | 511 |
| <i>T. Burschil, C. M. Krawczyk, O. Hellwig</i>  |     |
| <b>INVESTIGATION OF THE SEA WATER INTRUSION BY USING SLINGRAM AND 2D RESISTIVITY IMAGING METHODS</b> .....                            | 516 |
| <i>B. B. Coban, S. Goren, K. H. Coban, A. E. Babacan</i>  |     |
| <b>THE DISCUSSION OF THE UNCERTAINTY IN THE TRAVELTIME SEISMIC TOMOGRAPHY</b> .....   | 521 |
| <i>B. Owoc, A. Górszczyk, M. Majdanski</i>  |     |
| <b>MISINTERPRETATION CAUSED BY 3D EFFECTS ON 2D ELECTRICAL RESISTIVITY TOMOGRAPHY - TESTS ON SIMPLE MODELS</b> .....                  | 526 |
| <i>R. Martorana, P. Capizzi, A. Carollo</i>   |     |
| <b>EFFECTIVE REGULARIZATION PARAMETERS IN 4D ERT INVERSION</b> .....  | 531 |
| <i>D. Jeong, I. K. Kim, E. M. Kim, Y. J. Kim, K. S. Kim, H. H. Yong</i>   |     |
| <b>UNCERTAINTY BASED MULTI-STEP SEISMIC ANALYSIS FOR THE NEAR SURFACE IMAGING</b> .....   | 536 |
| <i>A. Marciniak, I. Stan-Kleczyk, A. Idziak, M. Majdanski</i>   |     |
| <b>SHALLOW SEISMIC IMAGING FOR LAND NODAL SEISMIC DATA</b> .....  | 541 |
| <i>S. Jang, D. Lee</i>  |     |
| <b>INVERSION OF FW-IP DATA - SENSITIVITY ANALYSIS AND SYNTHETIC INVERSIONS THROUGH LOCAL AND GLOBAL OPTIMIZATION STRATEGIES</b> ..... | 546 |
| <i>A. Vinciguerra, M. Aleari, P. Costantini</i>   |     |
| <b>ENHANCED Q ESTIMATION BY ITERATIVE SPECTRAL RATIO METHOD FOR HIGH RESOLUTION SEISMIC REFLECTION IMAGE</b> .....                    | 551 |
| <i>P. Scholtz, G. Szots</i>   |     |
| <b>2-D AND 3-D MODIFIED ELECTRICAL RESISTIVITY SURVEY FOR THE EFFECTIVE FLOW PATH DETECTION OF A HYDRAULIC FACILITY</b> .....         | 556 |
| <i>B. Lee, S. Oh, M. J. Lee</i>   |     |
| <b>A NEW WORKFLOW FOR SURFACE WAVE FWI COMBINING GENETIC ALGORITHM AND GRADIENT-BASED OPTIMIZATION ALGORITHMS</b> .....               | 561 |
| <i>Z. Xing, F. Rappisi, A. Mazzotti</i>   |     |
| <b>FINITE DIFFERENCE MODELLING OF RAYLEIGH WAVES WITH NONUNIFORM GRID SPACING</b> .....   | 566 |
| <i>M. Causemann, Y. Pan, T. Bohlen</i>  |     |
| <b>3D INVERSION PROGRAM TO DEFINE CAVES MORPHOLOGY THROUGH MINIMA FROM GRAVITY ANOMALY</b> .....                                      | 571 |
| <i>F. J. Martínez-Moreno, F. A. Monteiro Santos, J. Galindo Zaldívar, L. González Castillo, A. Pedrera</i>                            |     |
| <b>INVESTIGATION OF THE EFFECTS OF INDUCED POLARIZATION OVER THE HYDROCARBONS DEPOSIT IN THE SOUTH OF YAKUTIA</b> .....               | 576 |
| <i>M. Shkirya, Y. Davidenko, D. Bogdanovich, S. Bukhalov, A. Belova, A. Bashkeev</i>  |     |
| <b>HIGH-RESOLUTION SOIL ELECTRICAL CONDUCTIVITY IMAGING FROM EMI DATA USING TRAINING-IMAGE BASED PROBABILISTIC INVERSION</b> .....    | 581 |
| <i>D. Moghadas</i>  |     |
| <b>SEPARATION OF RAYLEIGH WAVE FROM AMBIENT NOISE DATA BY INSTANTANEOUS POLARIZATION</b> .....  | 586 |
| <i>M. Kazemnia Kakhki, F. Peters, J. Webe, S. Hooshmand Ghazvini</i>  |     |



|   |            |
|---|------------|
| <b>USING CONE PENETRATION TEST INFORMATION TO CONSTRAIN MARINE ERT<br/>INVERSION .....</b>  | <b>591</b> |
| <i>M. Karaoulis, P. Vos, S. De Vries, M. De Kleine, P. Kruiver, P. Tsourlos</i>   |            |
| <b>A QUANTITATIVE COMPARISON OF GPR SECTIONS TO REDUCE GEOLOGICAL PRIOR<br/>UNCERTAINTY .....</b>   | <b>596</b> |
| <i>G. Pirot, E. Huber, J. Irving, N. Linde</i>  |            |
| <b>THE PROJECTED GRADIENT METHOD FOR THE RECOVERY RESEARCH OF SUB-<br/>SURFACE ROCK DENSITY .....</b>                                     | <b>601</b> |
| <i>Z. Meng, F. Li</i>   |            |
| <b>TECHNIQUE AND NEAR-SURFACE APPLICATION OF THE CONTROLLED SOURCE<br/>RADIOMAGNETOTELLURICS WITH A HORIZONTAL ELECTRIC DIPOLE .....</b>  | <b>606</b> |
| <i>A. Saraev, A. Shlykov, B. Tezkan</i>   |            |
| <b>TMAG - A NEW TOWED GRADIENT MAGNETOMETER ARRAY FOR NEAR SURFACE<br/>GEOPHYSICST .....</b>  | <b>611</b> |
| <i>A. Kass, E. Auken, A. Christiansen</i>   |            |
| <b>DELINEATION OF MEANDERING CHANNELS USING MULTI SEISMIC ATTRIBUTES.....</b>   | <b>616</b> |
| <i>I. V. S. Chanakya, B. Kumari</i>   |            |
| <b>INTEGRATED FIELD SURVEYS WITH COMPLEX OF ELECTROPROSPECTING METHODS<br/>USING BROADBAND MULTIFUNCTION EM INSTRUMENTS .....</b>         | <b>621</b> |
| <i>I. Ingerov, I. Mendrii, A. Lozoviy</i>   |            |
| <b>LOUPE - A PORTABLE TIME DOMAIN EM SYSTEMS FOR NEAR SURFACE<br/>INVESTIGATIONS .....</b>  | <b>626</b> |
| <i>G. Street, A. C. Duncan</i>  |            |
| <b>VS30 STRUCTURE OF MURCIA CITY (SOUTHEAST OF SPAIN) FROM MINI-ARRAY<br/>OBSERVATIONS AND HVSR MEASUREMENTS .....</b>                    | <b>631</b> |
| <i>R. Candela-Medel, Y. Oda, M. Navarro, T. Enomoto, A. García-Jerez</i>  |            |
| <b>INTEGRATED INVERSION OF THE QUANTITATIVE SEISMIC INTERPRETATION RESULT<br/>AND ELECTROMAGNETIC DATA USING STRUCTURE TENSOR.....</b>    | <b>636</b> |
| <i>B. Kim, J. Byun, S. Oh</i>   |            |
| <b>IMPROVED DESCRIPTION OF THE ACOUSTIC WAVE PARAMETERS – PRESSURE<br/>RELATIONS WITH NEW DOUBLE RELAXATION MODELS .....</b>              | <b>641</b> |
| <i>A. Kiss, D. O. B. N. Nuamah, M. Dobróka</i>  |            |
| <b>JOINT ROCK PHYSICS INVERSION OF SEISMIC AND ELECTROMAGNETIC DATA FOR<br/>CO2 MONITORING AT SLEIPNER.....</b>                           | <b>646</b> |
| <i>I. Subagio, B. Dupuy, J. Park, A. Romdhane, E. Querez, A. Stovas</i>   |            |
| <b>LAND CSEM IMPULSE RESPONSES IN SIMPLE LAYERED MODELS .....</b>   | <b>651</b> |
| <i>E. Slob, A. Ziolkowski</i>   |            |
| <b>POTENTIAL ZONES IN EUROPE FOR COMBINING CCS AND GEOTHERMAL ENERGY.....</b>   | <b>656</b> |
| <i>E. Miranda-Barbosa, R. Shortall, E. Tzimas</i>   |            |
| <b>HIGH-RESOLUTION AEROMAGNETIC SURVEY IN THE MUSADAKE GEOTHERMAL<br/>FIELD AREA, EASTERN HOKKAIDO JAPAN .....</b>                        | <b>661</b> |
| <i>S. Okuma, T. Nakatsuka, M. Makino, Y. Ishizuka, A. Miyakawa, Y. Murata, M. Iwata, Y. Kida, M. Kameyama, Y. Yuuki, H. Wada</i>          |            |
| <b>CHARACTERIZATION OF A HYDROTHERMAL FRACTURE NETWORK EMBEDDED IN<br/>CRYSTALLINE ROCK UTILIZING BOREHOLE RADAR AND GEOPHYSICS .....</b> | <b>666</b> |
| <i>A. Greenwood, E. Caspari, D. Egli, L. Baron, K. Holliger</i>   |            |
| <b>INVESTIGATION OF HISTORICAL BUILDINGS SOIL-STRUCTURE INTERACTION AND<br/>RESONANCE RISK - A CASE STUDY OF TRABZON .....</b>            | <b>671</b> |
| <i>O. Akin, A. E. Babacan</i>   |            |
| <b>DETECTION OF TECTONIC LINEAMENTS USING AEROMAGNETIC AND REMOTE<br/>SENSING DATA FOR THE SOUTH-EAST IRAN AREA .....</b>                 | <b>676</b> |
| <i>I. Masoumi, M. Sekandari, G. Kamali</i>  |            |
| <b>JOINT INVERSION OF MASW AND RAYLEIGH WAVE ELLIPTICITY IN THE SITE<br/>CHARACTERIZATION OF PLLN ALLUVIAL AREA, VFX, N LISBON .....</b>  | <b>683</b> |
| <i>I. Lopes, G. Tavares, G. Ferreira, B. Peniche, J. Santos</i>   |            |
| <b>RELATIONSHIPS BETWEEN P-WAVE VELOCITY AND ROCK QUALITY DESIGNATION - A<br/>CLUSTERING PERSPECTIVE .....</b>                            | <b>688</b> |
| <i>A. Kopic, D. T. Kieu</i>   |            |
| <b>HIGH-RESOLUTION GEOELECTRICAL CHARACTERIZATION OF STEEP PYROCLASTIC<br/>SLOPES BY A NEW 3D DATA ACQUISITION TECHNIQUE .....</b>        | <b>693</b> |
| <i>C. De Paola, R. Di Maio, E. Piegari</i>  |            |

|   |            |
|---|------------|
| <b>APPLICATION OF ELECTRICAL AND SEISMIC GEOPHYSICAL METHODS FOR SHALLOW KARSTIC ZONES DETECTION AT LIMESTONE ROCKS .....</b>       | <b>698</b> |
| <i>E. Amanatidou, G. Vargemezis, P. Tsourlos, C. Papazachos</i>   |            |
| <b>A NEW INVERSION SCHEME TO DERIVE SOIL-WATER CHARACTERISTIC CURVE IN AN UNSATURATED DYKE .....</b>                                | <b>703</b> |
| <i>A. Suzuki, S. Minato, R. Ghose</i>   |            |
| <b>PAIRED CROSSHOLE S-WAVE MEASUREMENTS TO ACCESS SOIL STRESS HISTORY .....</b>   | <b>708</b> |
| <i>S. Mackens, H. Yousfi, U. Werban, U. Kodel, T. Fechner</i>   |            |
| <b>AN APPLICATION OF TIME LAPSE ERT MONITORING ON A RIVER LEVEE DURING FLOOD EVENTS .....</b>                                       | <b>713</b> |
| <i>Y. Yamashita, T. Kobayashi, D. Kurata, T. Abe</i>  |            |
| <b>COMBINING GEOPHYSICAL TECHNIQUES TO ASSESS GEOMETRY AND STREAM-AQUIFER INTERACTIONS IN A COASTAL ALLUVIAL AQUIFER? .....</b>     | <b>718</b> |
| <i>M. C. Paz, F. J. Alcalá, P. Martínez-Pagán, J. Pérez-Cuevas, L. Ribeiro</i>  |            |
| <b>FRACTURE DETECTION AND SECONDARY POROSITY ESTIMATION IN BASEMENT TERRAIN USING CROSSED SQUARE ARRAY RESISTIVITY METHOD .....</b> | <b>723</b> |
| <i>O. Bayewu, M. Oloruntola, G. Mosuro, T. Laniyan, K. Bakare</i>   |            |
| <b>OBSERVATION OF PIPING BEHIND LEVEES USING ELECTRICAL RESISTIVITY TOMOGRAPHY .....</b>  | <b>728</b> |
| <i>M. Karaoulis, M. De Kleine, J. Heerma, P. Kruiver, P. Tsourlos</i>   |            |
| <b>EFFECTS OF SEISMIC ANISOTROPY ON TARGET DEPTH DETERMINATION IN GEOTHERMAL EXPLORATION .....</b>                                  | <b>733</b> |
| <i>D. Köhn, T. Jusri, W. Rabbel, H. B. Motra, L. Schreiter, M. Thorwart, D. De Nil, F. Wutke, S. Buske</i>                          |            |
| <b>SELF-POTENTIAL RESPONSE OF PARTIALLY PENETRATING WELLS - NUMERICAL MODELLING .....</b>   | <b>738</b> |
| <i>P. Konosavsky, K. Titov</i>  |            |
| <b>NEAR-SURFACE SHEAR-WAVE VELOCITY PROFILING WITH AMBIENT NOISE SEISMIC INTERFEROMETRY FOR GEOTHERMAL EXPLORATION .....</b>        | <b>743</b> |
| <i>A. Verdel, D. Van Haeringen, V. Vandeweyer, S. Carpentier, S. Meekes</i>   |            |
| <b>DE-RISKING SHALLOW GEOTHERMAL ENERGY STORAGE IN CHALLENGING URBAN ENVIRONMENTS .....</b>   | <b>748</b> |
| <i>V. Vandeweyer, S. Carpentier, B. Paap, G. Blacquiere, R. Jansen, T. Reinsch</i>  |            |
| <b>A NEW 2D FINITE ELEMENT FORWARD SOLUTION ALGORITHM FOR DC RESISTIVITY METHOD FOR LARGE SCALE RESISTIVITY SURVEY .....</b>        | <b>753</b> |
| <i>M. E. Candansayar, I. Demirci</i>  |            |
| <b>SURFACE SEISMIC MONITORING OF NEAR SURFACE CO2 INJECTION AT SVELVIK - SYNTHETIC STUDY .....</b>                                  | <b>758</b> |
| <i>A. Romdhane, E. Querendez, P. Eliasson</i>   |            |
| <b>S-WAVE IMAGING OF GLACIAL OVERDEEPEMED ALPINE VALLEYS – SINGLE-COMPONENT .....</b>   | <b>763</b> |
| <i>T. Burschil, H. Bunn</i>   |            |
| <b>SEA DIKE EVALUATION BY SH FULL WAVEFORM INVERSION .....</b>  | <b>768</b> |
| <i>D. Koehn, D. Wilken, T. Meier, T. Steinkraus, D. Schulte-Kornack, D. De Nil, R. Kirsch, W. Rabbel</i>                            |            |
| <b>3D SEISMIC APPLICATION FOR MAE MOH COAL MINE DEVELOPMENT .....</b>   | <b>773</b> |
| <i>E. Gillot, A. Ponglungca, P. Mounier, C. Timberlake</i>  |            |
| <b>UNRAVELLING CONTAMINANT PATHWAYS THROUGH A DETAILED SEISMIC INVESTIGATION, VARBERG - SOUTHWEST SWEDEN .....</b>                  | <b>778</b> |
| <i>A. Malehmir, M. Lindén, O. Friberg, B. Brodic, H. Möller, M. Svensson</i>  |            |
| <b>ROCK STABILITY AS DETECTED BY SEISMIC NOISE RECORDINGS - THREE CASE STUDIES .....</b>  | <b>783</b> |
| <i>M. Taruselli, D. Arosio, L. Longoni, M. Papini, A. Corsini, L. Zanzi</i>   |            |
| <b>SEISMIC IMAGING OF ROCK DISTURBANCE IN EXCAVATED SLOPES .....</b>  | <b>788</b> |
| <i>A. Butcher, A. Stork, A. Koe, J. Verdon, J. Kendall</i>  |            |
| <b>REPROCESSING AND 3D PRESENTATION OF ERT DATA FROM THE UNSTABLE ROCK SLOPE AREA AT ÅKNES, WESTERN NORWAY .....</b>                | <b>793</b> |
| <i>G. Tassis, J. S. Rønning, E. Dalsegg</i>   |            |
| <b>MASSIVE LANDSLIDE CHARACTERIZATION USING REFRACTION SEISMIC AND ELECTRIC TOMOGRAPHY .....</b>                                    | <b>798</b> |
| <i>S. Z. Ostrowski, M. Lasocki</i>  |            |
| <b>MULTIVARIATE GEOPHYSICAL SURVEY TO DETECT A SHALLOW FAULT ZONE IN A LANDFILL PROJECT AREA .....</b>                              | <b>803</b> |
| <i>P. Capizzi, A. Carollo, M. Gasparo Morticelli, R. Martorana, A. Sulli</i>  |            |

|  |            |
|--|------------|
| <b>SEASONAL TEMPERATURE MONITORING AND MODELLING FOR SEEPAGE RECONNAISSANCE IN AN EMBANKMENT DAM.....</b>                            | <b>808</b> |
| <i>T. Yun, K. E. Butler, K. T. B. Macquarrie, B. McLean, I. Campbell</i>   |            |
| <b>GEOPHYSICAL AND GEOCHEMICAL CHARACTERIZATION OF PHOSPHOGYPSUM WASTES FROM AN ANCIENT FERTILIZER PLANT.....</b>                    | <b>813</b> |
| <i>M. D. Vázquez, M. A. Martínez, J. Acosta, Á. Faz</i>  |            |
| <b>GEOELECTRICAL AND EMI STUDIES AT AN URBAN SITE IN BUENOS AIRES, ARGENTINA, FOR LOCALIZING AN OLD TUNNEL.....</b>                  | <b>818</b> |
| <i>M. V. Bongiovanni, V. Grunhut, P. Martinelli, M. De La Vega, N. Bonomo</i>  |            |
| <b>MORPHOLOGICAL AND VOLUMETRIC ASSESSMENT OF PYRITE ASHES POND BY ELECTRICAL RESISTIVITY TOMOGRAPHY.....</b>                        | <b>823</b> |
| <i>M. A. Martínez, M. D. Vázquez, J. Acosta, Á. Faz</i>  |            |
| <b>THE USE OF GEOPHYSICAL METHODS IN IDENTIFYING TREE ROOTS IN URBAN AREAS.....</b>  | <b>828</b> |
| <i>A. Mihai, A. Gereá</i>  |            |
| <b>COMPARISON BETWEEN DC ERT AND MOVING MULTI-DEPTH ELECTROSTATIC ARRAYS IN AN URBAN CONTEXT.....</b>                                | <b>833</b> |
| <i>S. Rejkjær, C. Finco, C. Schamper, F. Réjiba, R. Guérin, T. Dahlin, A. Tabbagh</i>  |            |
| <b>ELECTRICAL FLOW PATHS AND THE APPLICATION OF THE RESISTIVITY METHOD TO THE EVALUATION OF LANDFILL'S LINING SYSTEMS.....</b>       | <b>838</b> |
| <i>R. Mota</i>   |            |
| <b>APPLICATION OF MULTICHANNEL ANALYSIS OF SURFACE WAVES TO OBTAIN SOIL CLASSIFICATION OF EL EJIDO TOWN.....</b>                     | <b>843</b> |
| <i>M. C. García Nieto, M. A. Martínez Segura, A. García Jerez, J. F. Navarro López, M. Navarro, M. Arrien, H. Seivane</i>            |            |
| <b>MULTI-OBJECTIVE PARTICLE SWARM OPTIMIZATION OF VERTICAL ELECTRICAL SOUNDING AND TIME-DOMAIN ELECTROMAGNETIC DATA.....</b>         | <b>848</b> |
| <i>F. Pace, A. Godio, A. Santilano</i>   |            |
| <b>TIME-LAPSE 4-D RESISTIVITY IMAGING INVERSION WITH POSITIVITY CONSTRAINTS.....</b>   | <b>853</b> |
| <i>M. H. Loke, P. B. Wilkinson, T. Dahlin, J. E. Chambers, S. Uhlemann, T. Dijkstra</i>  |            |
| <b>INDUCTION-FREE ACQUISITION RANGE IN SPECTRAL TIME- AND FREQUENCY-DOMAIN INDUCED POLARIZATION AT FIELD SCALE.....</b>              | <b>858</b> |
| <i>G. Fiandaca</i>   |            |
| <b>EVALUATION OF THE EFFECT OF MICRO-TOPOGRAPHY OF A POTATO FIELD ON ERT TO ASSESS SOIL MOISTURE PATTERNS IN SANDY SOIL.....</b>     | <b>863</b> |
| <i>T. Manhaeghe, F. Wagner, G. Dumont, S. Garré</i>  |            |
| <b>A LABORATORY EXPERIENCE TO ASSESS THE 3D EFFECTS ON 2D ERT MONITORING OF RIVER LEVEES.....</b>                                    | <b>868</b> |
| <i>D. Arosio, A. Hojat, V. I. Ivanov, M. H. Loke, L. Longoni, M. Papini, G. Tresoldi, L. Zanzi</i>                                   |            |
| <b>A SIMPLIFIED APPROACH TO ARRAY OPTIMIZATION FOR THE DC RESISTIVITY AND INDUCED POLARIZATION METHOD.....</b>                       | <b>873</b> |
| <i>S. Rejkjær, D. Belfrage, T. Dahlin, P. Tsourlos</i>   |            |
| <b>APPLICATION OF STRUCTURALLY SIMILARITY CONSTRAINTS ON TIME-DOMAIN ELASTIC FULL-WAVEFORM INVERSION.....</b>                        | <b>878</b> |
| <i>N. Athanasopoulos, E. Manukyan, T. Bohlen, H. Maurer</i>  |            |
| <b>JOINT INVERSION ON IRREGULAR MESHES.....</b>  | <b>883</b> |
| <i>C. Jordi, J. Doetsch, T. Günther, C. Schmelzbach</i>  |            |
| <b>1D FULL WAVEFORM INVERSION OF GPR DATA BY PARTICLE SWARM OPTIMIZATION.....</b>  | <b>888</b> |
| <i>I. Kaplanvural, E. Peksen</i>   |            |
| <b>CO-OPERATIVE INVERSION OF ELECTRICAL RESISTIVITY TOMOGRAPHY AND SEISMIC REFLECTION DATA: AN EXAMPLE WITH LANDSLIDES DATA.....</b> | <b>893</b> |
| <i>D. T. Kieu, A. Kepic</i>  |            |
| <b>COMPARISON OF GROUND-ROLL ATTENUATION METHODS FOR NEAR SURFACE INVESTIGATIONS.....</b>  | <b>898</b> |
| <i>A. Tognarelli</i>   |            |
| <b>EVALUATION OF SHALLOW SEISMIC REFLECTION RESOLUTION ON AN OUTCROP ANALOG TO CAMPOS BASIN (BRAZIL) SANDSTONES RESERVOIRS.....</b>  | <b>903</b> |
| <i>O. Lima Neto, M. A. Cetale Santos, A. Theophilo Silva, F. Timoteo, E. Costa Ramos</i>   |            |
| <b>ENHANCED CROSS-WELL SEISMIC INVERSION BY FUZZY C-MEANS CLUSTERING.....</b>  | <b>908</b> |
| <i>D. T. Kieu, S. J. Rastin, A. Kepic</i>  |            |
| <b>EVIDENCES OF SEISMIC FLYSCH ANISOTROPY IN THE GULF OF TRIESTE.....</b>  | <b>913</b> |
| <i>S. Picotti, M. Dal Cin, G. Böhm, M. Busetti</i>   |            |

|  |             |
|--|-------------|
| <b>JOINT VP AND VS MONTE CARLO INVERSION FROM SURFACE WAVE DATA .....</b>  | <b>918</b>  |
| <i>F. Khosro Anjom, S. M. Muriuki, C. Comina, V. Socco</i>   |             |
| <b>FULL-WAVEFORM INVERSION OF NEAR-SURFACE SEISMIC DATA IN ANISOTROPIC MEDIA .....</b>   | <b>923</b>  |
| <i>V. Krampe, Y. Pan, T. Bohlen</i>  |             |
| <b>EXPERIENCES FROM MICROGRAVITY METHOD APPLICATION IN ABANDONED COAL MINE SITES - TWO EXAMPLES FROM AUSTRIA AND SLOVAKIA .....</b>                  | <b>928</b>  |
| <i>R. Pasteka, P. Zahorec, J. Papco, D. Kusnirak, R. Putiska, A. Mojzes, I. Zvara, M. Lesko, M. Bielik, M. Plakinger</i>                             |             |
| <b>MONITORING WASTEWATER DISPOSAL DYNAMICS THROUGH INFILTRATION PONDS BY USING TIME-LAPSE ERT SURVEY .....</b>                                       | <b>933</b>  |
| <i>L. De Carlo, R. Masciale, I. Portoghese, M. Vurro, M. C. Caputo</i>   |             |
| <b>NEAR-SURFACE CHARACTERIZATION OF THE LLANCANELO LAKE REGION (ARGENTINA) BY SURFACE-WAVE ANALYSIS OF 2D REFLECTION DATA .....</b>                  | <b>938</b>  |
| <i>L. Onnis, A. M. Osella, R. Violante, J. Carcione</i>  |             |
| <b>IMPROVING THE RESOLUTION OF ERT ARRAYS ACQUIRED WITH FEW ELECTRODES FROM MIXING CONCATENATED SECTIONS AFTER SMALL LATERAL DISPLACEMENTS .....</b> | <b>943</b>  |
| <i>A. Urruela, M. Himi, R. Lovera, L. Rivero, R. García, F. Pinheiro Lima Filho, A. Casas</i>  |             |
| <b>A TIME SPACE GROUNDWATER CONTAMINATION INVESTIGATION IN AN INDUSTRIAL SITE USING GEOPHYSICAL AND HYDROCHEMICAL METHODS .....</b>                  | <b>948</b>  |
| <i>T. Marques, C. Patinha, J. Ribeiro, E. Silva, M. J. Senos Matias</i>  |             |
| <b>DESCRIBING NECESSITY OF OPTIMIZING OF INJECTION/PRODUCTION RATE FOR ONE OF OFFSHORE IRANIAN OIL FIELD-CASE STUDY .....</b>                        | <b>953</b>  |
| <i>M. Rezaee, N. Yousofi, M. S. Safavi, M. Ghorbani Sheikhneshin, M. Mavaddat, M. Farzamian</i>  |             |
| <b>SEASONAL ERT MONITORING OF SUBSURFACE PROCESSES CONNECTED TO FREEZING AND SNOW MELT .....</b>   | <b>958</b>  |
| <i>D. Krzeminska, T. Starkloff, E. Bloem</i>   |             |
| <b>IN-SITU GEOPHYSICAL AND HYDRO-GEOCHEMICAL MONITORING FOR LANDSLIDE DYNAMICS (LODÈVE LANDSLIDE, FRANCE) .....</b>                                  | <b>963</b>  |
| <i>N. Denchik, S. Gautier, M. Dupuy, C. Batiot, V. Léonardi, P. A. Pezard, M. Geeraert, G. Henry, D. Neyens</i>                                      |             |
| <b>APPLICATION OF GEOELECTRIC METHODS FOR THE TECHNOGENIC ACCUMULATION OF LOST OIL PRODUCTS DETECTION AND LOCALIZATION .....</b>                     | <b>968</b>  |
| <i>S. P. Levashov, M. A. Yakymchuk, I. N. Korchagin, D. Bozhezha</i>   |             |
| <b>GEOELECTRICAL IMAGING OF CONCEALED OBJECTS WITH CAPACITIVE SENSOR ARRAYS .....</b>  | <b>973</b>  |
| <i>O. Kuras, R. Swift, S. Uhlemann, P. Wilkinson, C. Inauen, P. Meldrum</i>  |             |
| <b>ADIABATIC PULSES TO IMPROVE MRS MEASUREMENTS .....</b>  | <b>978</b>  |
| <i>T. Radic</i>  |             |
| <b>LABORATORY EXPERIMENTS OF NEUTRON INDUCED GAMMA RAY SPECTROMETRY TOOL .....</b>   | <b>983</b>  |
| <i>S. Hwang, J. Shin, B. Won, J. Kim, T. Doh</i>   |             |
| <b>MAGNETIC AND MINERALOGY ANALYSIS OF SOILS OF HYDROCARBON PROSPECTIVE AREAS IN UKRAINE .....</b>   | <b>988</b>  |
| <i>O. Menshov, R. Kuderavets, I. Chobotok</i>  |             |
| <b>A CASE STUDY - RECOGNITION THE SOURCE OF WATER PRODUCTION IN A GAS FIELD .....</b>  | <b>993</b>  |
| <i>M. Mavaddat, E. Ghanaatpisheh Senani, S. M. Mirbagheri</i>  |             |
| <b>A MATLAB SCRIPT TO PERFORM GRAVITY TERRAIN CORRECTIONS USING DEM-EU DIGITAL ELEVATION MODEL IN A TEACHING LAB .....</b>                           | <b>998</b>  |
| <i>F. Almeida, M. Matias, M. Lourenço, A. Martins</i>  |             |
| <b>JOINT WAVE FIELD RECONSTRUCTION AND WAVE EQUATION INVERSION FOR NEAR-SURFACE PROPERTIES .....</b>   | <b>1003</b> |
| <i>A. Shaiban, S. De Ridder, A. Curtis</i>   |             |
| <b>DEVELOPMENTS TRENDS BASED ON REALIZATION OF FIELD DEVELOPMENT DATA IN INDONESIA .....</b>   | <b>1008</b> |
| <i>A. Asnidar, A. A. Azizurrofi</i>  |             |
| <b>Author Index</b>  |             |