

Environmental and Engineering
Geophysical Society

20th Symposium on the Application of Geophysics to Engineering and Environmental Problems

SAGEEP 2007

“Geophysical Investigation and
Problem Solving for the Next Generation”

April 1-5, 2007
Denver, Colorado, USA

Volume 1 of 2

ISSN: 1554-8015

Printed from e-media with permission by:

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

ISBN: 978-1-60423-954-6

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

2007 Copyright

This CD-Rom of the Symposium on the Application of Geophysics to Engineering and Environmental Problems was produced for the Environmental and Engineering Geophysical Society by X-CD Technologies.

Duplication of the CD-Rom and its content in print or digital form for the purpose sharing with others is prohibited without permission from Environmental and Engineering Geophysical Society and X-CD Technologies. Also, copying this product's instruction and/or designs for the use on future CD-Rom's or digital products is prohibited without written permission from X-CD Technologies.

In no event will X-CD Technologies or its suppliers be liable for any consequential or incidental damages to your hardware or other software resulting from the installation and/or use of this CD-Rom.

Environmental & Engineering Geophysical Society
20th Symposium on the Application of Geophysics
to Engineering and Environmental Problems
2007

TABLE OF CONTENTS

VOLUME I

Post-Tsunami Helicopter-Borne Electromagnetics Along the Coasts of Aceh, Indonesia	1
<i>B. Siemon, A. Steuer, U. Meyer, H. Rehli</i>	
New Results on Comparison of Different GPR Systems and Antenna Configurations at the Roman Site Carnuntum	6
<i>S. Seren, A. Eder-Hinterleitner, W. Newbauer, K. Locker, P. Melichar</i>	
Dynamics and Water and Solutes at Urban Locations	13
<i>No Author Given</i>	
Geological Model to Forecast Critical Changes at the Surface of Mine Water Tables	17
<i>No Author Given</i>	
Geophysical Investigation of the Success Dam Foundation: An Overview	21
<i>L. Hunter, M. Powers, S. Haines, T. Asch, B. Burton</i>	
Compressional and Shear Wave Seismic Refraction Tomography at Success Dam, Poerterville, California	31
<i>M. Powers, S. Haines, B. Burton</i>	
Electrical Characterization of Success Dam in Porterville, California	41
<i>T. Asch, B. Burton, M. Powers, B. Rodrigues, P. Bedrosian</i>	
The Use of Geophysics in Levee Assessment	61
<i>J. Dunbar, S. Smullen, J. Stefanov</i>	
Interrogating Levees in Texas, New Mexico and New Orleans using Various Seismic Methods	69
<i>J. Ivanov, R. Miller, J. Dunbar, J. Lane Jr.</i>	
Geophysical Surveys for Assessing Levee Foundation Conditions, Feather River Levees, Marysville, CA	82
<i>J. Llopis, J. Simms</i>	
Integrated Geophysical Investigation for the Vulnerability Assessment of Earthen Levee	90
<i>T. Inazaki</i>	
Summary of New Developments in TDR for Soils	98
<i>V. Drnevich, R. Nowack</i>	
Soil Texture from TDR Waveform Analysis	108
<i>C. Zambrano, V. Drnevich, X. Yu, R. Nowack</i>	
TDR for Compaction Control of Granular Materials with Large Particle Sizes	129
<i>A. Evans, V. Drnevich</i>	
Advances in Air-Coupled Lamb Wave Scanning	146
<i>A. Gibson, N. Ryden, J. Popovics</i>	

Application of Probabilistic Approach to the Solution of Inverse Problems in Nondestructive Testing and Engineering Geophysics	156
<i>R. Hadidi, N. Gucunski, A. Maher</i>	
Stresses Analysis of the Area Between Aswan and Red Sea Hills, Egypt using Magnetic and Anisotropy Techniques	166
<i>A. Saleh, M. Mekkawi</i>	
Combining Multiple Seismic and Ground Penetrating Radar Techniques to Analyze Geologic Controls of Riparian Meadow Complexes in the Central Basin, Nevada USA	174
<i>K. Sturtevant, G. Baker, M. Lord, J. Miller, D. Jewitt, D. Germanoski, J. Chambers</i>	
3-D Electrical Resistivity Imaging (ERI) of a Potential Mine Stoop	182
<i>R. Lee</i>	
Defeat the Dragon: Coal Fires Between Self Ignition and Fire Fighting	188
<i>M. Wuttke, S. WeBling, W. Kessels</i>	
Using Airborne Electromagnetic Data to Construct a Sediment Textural Model and Salt Budget for Use in Hydrogeological Applications: A Case Study from New South Wales, Australia	201
<i>K. Tan, L. Halas, H. Apps</i>	
Detection of Subsurface Diesel Contamination Using Electromagnetic Induction Geophysical Techniques	209
<i>J. Cooper, S. Jin</i>	
Electrical Resistivity Imaging to Monitor a Simulated Leak from an Underground Storage Tank at a Radiological Waste Facility	220
<i>B. Cabbage, D. Rucker, M. Levitt, S. Calendine</i>	
Case Study: Resistivity Variation with Biodegradation in a Refinery Oil Dump in Brazil	230
<i>G. Castilho, D. Maia, M. Pessoa</i>	
Integrated Geophysical Approach for Mapping an Active Landslide in Himalaya: A Case Study	237
<i>R. Sastry, S. Mondal, P. Gautam, A. Pachauri</i>	
Wide Area Assessment of Munitions-Contaminated Sites	244
<i>H. Nelson, A. Andrews</i>	
Determination of Soil Magnetic Susceptibility from Electromagnetic Induction Measurements	253
<i>R. North, J. Simms</i>	
Airborne and Ground-Based Electromagnetic Investigation of the Fresh-Water Potential in Tsunami-Hit Areas of Northern Sumatra	265
<i>A. Steuer, B. Siemon, D. Eberle</i>	
Contaminants Evaluation as Indicators of Water Quality in Ago-Iwoye, Southwestern, Nigeria	276
<i>O. Fasunwon, J. Olowofela, O. Akinyemi, O. Akintokun</i>	
Twenty Years of Progress in Electromagnetic Exploration for Near-Surface Geophysics	283
<i>P. Hoekstra</i>	
Two Decades of Near-Surface Seismology Progress	288
<i>D. Steeples, R. Miller</i>	

Engineering and Environmental Applications of the Potential Field Methods of Geophysics	299
<i>D. Butler</i>	
Adventures in Seeing the Unseen - From Borehole to the Moon	312
<i>G. Olhoeft</i>	
In the Land of the Blind a One-Eyed Man is King	321
<i>R. Crowder</i>	
Great Expectations - Geophysics and Geotechnics	333
<i>R. Woods</i>	
From Polaroid Film to Data Acquisition Systems and Field Laptops	338
<i>F. Haeni</i>	
Shallow Seismic Reflection Methods for the Delineation and Hydrogeological Characterization of Buried Eskers in Eastern Ontario	348
<i>S. Pullan, A. Pugin, J. Hunter</i>	
Comparison of Compressional and Shear Wave Seismic Reflection Methods for Characterizing Aquifer Stratigraphy at the Former Fort Ord, California	357
<i>S. Haines</i>	
Principle and Application of 4D Microgravity Survey for Engineering Purpose, Case Example: Groundwater Level Lowering and Subsidence in Residential Area of Jakarta	367
<i>W. Kadir, D. Santoso, S. Alawiyah</i>	
Evaluating the Feasibility of Artificial Recharge Sites using High Resolution Electrical Methods Near Victorville, California	376
<i>J. Jansen, L. Eckhart, A. Garcia, T. Powell</i>	
Applicability of DC Resistivity Imaging to Investigating the Feedback Mechanism between Water Quality and Transpiration Beneath Circular Islands in the Okavango Delta, Botswana: A Case Study of Thata Island	385
<i>L. Molwalefhe, E. Shemang</i>	
Mapping Salt-Loads of the Murray River, Australia, Using Airborne and In-River Electromagnetic Methods	399
<i>A. Fitzpatrick, T. Munday, V. Berens, M. Hatch, A. Telfer</i>	
Improved Mapping of Conductive Clays and Groundwater Salinity Using Attitude-Corrected Helicopter-Borne EM	407
<i>G. Hodges, T. Munday, A. Heydorn, A. Fitzpatrick</i>	
After the Helicopter is Gone: Investigating Anomalies in Stream-Axis EM Data from the Colorado River, Texas	415
<i>J. Paine, E. Collins</i>	
Spatio-Temporal Monitoring of Floodplain Environments using Electromagnetic Methods: A Scaled Approach to Understanding Surface Water-Groundwater Interactions on the Chowilla Floodplain, South Australia	425
<i>T. Munday, I. Overton, A. Fitzpatrick, K. Cahill, V. Berens, M. Hatch, R. Brodie</i>	
The Effect of Lateral Inhomogeneities on the Interpretation of Shallow Refraction Seismic Data (Lateral Effects Problem)	434
<i>H. Seisa</i>	
Design of Linear Phase IIR Filters with Application to Processing of Seismic Data	442
<i>H. Mansour</i>	

Seismic Acoustic Research on Identification of Archeological Sites in Submersible Zones	450
<i>S. Anghel, G. Ion</i>	
Surface-Wave Sensitivity to a High-Velocity Inclusion	455
<i>X. Jin, B. Luke, K. Lipinska-Kalita</i>	
Modeling Seismic-Signature Wave Fields for Virtual Trials of Sensing Algorithms	463
<i>S. Ketcham, J. Lacombe, R. Greenfield</i>	
Using Surface Wave Methods for Earthquake Site Response Analyses: The Importance of Active Dispersion Data	471
<i>D. Bents, W. Camp</i>	
Seismic Risk Assessment of Highway Bridges in Clark County, Nevada	482
<i>A. Ebrahimpour, D. Porter, R. Sack, B. Luke</i>	
Evaluation of Soil Improvement via Blasting using Array-based Surface Wave Tests	490
<i>S. Yoon, G. Rix</i>	
A Geophysical Investigation of the Structural Controls Along the Southern Margin of Lake Ngami, Northwestern Botswana Using Seismic Refraction and DC Resistivity	498
<i>E. Shemang, L. Molwalefhe, E. Mosweu</i>	
Time Cross-Sections Generated From Shallow Seismic Refraction Data: Preliminary Results	507
<i>P. Torrese, P. Signanini</i>	
H. Reflection Surveys for Seismic Imaging of Unstable Slopes	517
<i>M. Rainone, P. Torrese</i>	
Geophysics for Quaternary - Fault Mapping in Cabo Rojo, Puerto Rico	526
<i>C. Roig, E. Asencio</i>	
New Instrumentation of Microseismic Monitoring System in Asse Research Mine in Germany	540
<i>H. Fricke</i>	
Installation of a Digital, Wireless, Strong-Motion Network for Monitoring Seismic Activity in a Western Colorado Coal Mining Region	548
<i>P. Swanson, C. Stewart, W. Koontz</i>	
Seismic Reflection Survey Using Shear-Wave Vibrator for an Active Fault	555
<i>T. Kurahashi, T. Inazaki</i>	
Surface Variations in the Earth's Magnetic Field: Implications for Near-Surface MRI	563
<i>C. Bray, J. Hornak</i>	
Agricultural Soils Maps as a Framework for Conducting Shallow Subsurface Investigations in the Rio Grande Valley Near El Paso, Texas	571
<i>D. Doser, M. Baker, R. Langford, E. Imana</i>	
Geophysical Methods for Pile Length Determination: A Case Study at St. Joseph Hospital, Savannah, GA	579
<i>X. Yu, J. Fang, B. Zhang, J. Adams, G. Lin</i>	
GPR and DC Resistivity Application to Discontinuous Permafrost Delineation, Eielson Air Force Base, Alaska	589
<i>B. Astley, A. Delaney</i>	

Integrated Geophysical Investigation of Preferential Flowpaths at the Former TysonValley Powder Farm Near Eureka, Missouri	597
<i>B. Burton, L. Ball, G. Stanton</i>	
Test for Detecting an Impermeable Water Barrier in an Earth-Fill Dam in Austria Using MASW Method	610
<i>S. Hock, J. Ivanov, R. Miller</i>	
High Resolution Resistivity Imaging of Naitwar Bazar Landslide, Garhwal Himalaya, India	618
<i>S. Mondal, R. Sastry, P. Gautam, A. Pachauri</i>	
Practical Methods for Locating Abandoned Wells in Populated Areas	625
<i>G. Veloski, R. Hammack, R. Lynn</i>	
Characterizing Contaminated Groundwater Sites	642
<i>V. Kofoed, P. Rollins</i>	
Determination of Manning's Roughness Coefficients for Natural Channels and Rivers	646
<i>M. Ahmadi</i>	
Resistivity Structure of Rainier Mesa - Shoshone Mountain, Nevada Test Site, Nevada	662
<i>T. Asch</i>	
Wellfield Exploration for an Ethanol Plant using Photo-Lineament Analysis in Conjunction with 2-D Resistivity: A Case History	681
<i>G. Hebert, G. Byer</i>	

VOLUME II

Time Series Resistivity Analysis of Water Content Variation in Karst Terrain, Edwards Limestone, San Antonio, Texas	687
<i>M. Roberts, A. Dutton</i>	
Gravity, Magnetic & GPR Surveys for Massive Gold Deposits at a Philippine Treasure Site	693
<i>R. Soule</i>	
Successful Application of Geophysics at the Aganoa Archaeological Site, Island of Tutuila, American Samoa	702
<i>W. Sauck, F. Pearl, S. Eckert</i>	
Geophysical Investigations at an Archaeological Site in Marcus Hook, Pennsylvania	710
<i>H. Hamajima, K. Weyer</i>	
3D Visualization of 2D Electrical Surveys Integrated in Seismic and GPR Interpretation Softwares	716
<i>D. Maia, G. Castilho</i>	
The Utility of Multi-Electrode Resistivity Data in Geotechnical Investigations - A Case Study	720
<i>P. Gautam, R. Sastry, S. Mondal</i>	
Comparison of Survey Results from EM-61 and Beep Mat for UXO in Basaltic Terrain	727
<i>L. Beard, J. Sheehan, W. Doll, P. Gaucher, R. Desbiens, W. Mandell</i>	

A Practical and Autonomous Geophysical Platform	738
<i>R. Bowers, E. Close</i>	
Variability of Real UXO	744
<i>J. Miller, T. Furuya</i>	
Repeatability of Common UXO Detection & Discrimination Instruments	762
<i>R. North, E. Smith, A. Schwartz</i>	
A Comparison of the Repeatability of Different Methods for Determining Electromagnetic Time Decay Constants of MEC	773
<i>C. Murray, R. Grabowski, H. Wagner, N. Harrison</i>	
Operator Influence on UXO Sensor Technologies	780
<i>C. Appelt</i>	
Revealing of Subterranean Karst Using Modern Analysis of Potential and Quasi-Potential Fields	786
<i>L. Eppelbaum</i>	
The Effect and Mitigation of Vine Trellising on EM38 Soil Conductivity Measurements	800
<i>P. Clark, D. Lamb, R. Bradbury, P. Frazier</i>	
Comparison of Airborne EM Inversions to Cone Penetrometer Results for Identifying Clay Layers under Rio Grande Levees	812
<i>G. Hodges, J. Dunbar, S. Smullen</i>	
Use of Multi-Frequency Electromagnetic Profiling in a Remedial Investigation at Camp Kohler, McClellan Air Force Base	819
<i>R. Allen, R. Crowson</i>	
A GPR Investigation of Buried Infrastructure at the North Unit of Illinois Beach State Park	827
<i>T. Larson, C. Blakely, T. Young</i>	
Metallic and Plastic Landmine-Like Objects Assessment using GPR Technique	839
<i>M. Metwaly</i>	
Seismic Reflection: Upstream, Downstream, and on Earthen Dams and Dikes	850
<i>R. Miller, R. Markiewicz, S. Hartung, W. Hancock, J. Ivanov, J. Xia</i>	
Optimizing High Frequency Vibroseis Data	860
<i>T. Rademacker, R. Miller, S. Walters</i>	
Repeatability Observations from a 2D Time-Lapse Seismic Survey	867
<i>S. Walters, R. Miller, J. Dunbar, S. Smullen</i>	
Case Study of a Rapid Response Underwater Search for a Tow Missile	874
<i>A. Schwartz</i>	
Analysis of Naturally Occuring False Alarms at a UXO Test Site on Jefferson Proving Ground	888
<i>R. North</i>	
Electromagnetic Induction (EMI) Coil Sensitivity Maps for Evaluating Coil Designs and Configurations Used in the Geophysical Detection of Unexploded Ordnance (UXO)	895
<i>N. Jain, L. Riggs, B. Selfridge</i>	
EMI Detection and Discrimination of UXO using an Array of Fluxgate Magnetic Sensor	913
<i>M. Asten, A. Duncan</i>	

Berkeley UXO Discriminator (BUD)	922
<i>E. Gasperikova, J. Smith, H. Morrison, A. Becker</i>	
Applications of a Robotic Multi-Sensor UXO Detection Platform	929
<i>G. Schultz, J. Miller, L. Stamatescu, K. Kingdon, J. Keranen</i>	
Trend Removal and Detection of Overlapping Magnetic Field Anomalies by Wavelet Analysis	939
<i>V. Tsivouraki-Papafotiou, G. Tsokas, R. Hansen, A. Stampolidis, P. Tsourlos</i>	
Ground-Penetrating Radar for Urban Archaeological Mapping	947
<i>L. Conyers</i>	
Geophysical Investigation to Locate Buried Structures at the Site of an 18th Century House	955
<i>J. Hager, J. King, R. Buller</i>	
Geophysical Location, Identification, and Characterization of Archaeological Structures of the Jornada Mogollon People at the Three Rivers National Petroglyph, New Mexico	963
<i>J. Hincapie, D. Doser</i>	
GPR Survey of the Japanese Imperial Family Tombs in Miyazaki: Application of GPR Overlay Analysis	971
<i>D. Goodman, H. Hiromichi, N. Higashi, Y. Nishimura</i>	
Grade Estimation at CVRD INCO's Canadian Sulphide Mines	976
<i>G. McDowell, A. Mackie, M. Palkovits</i>	
Groundwater and Environmental Applications of Advanced Geophysical Logging Tools: Geochemical and Magnetic Resonance Tool Reviews	986
<i>N. Clayton, W. Wempe</i>	
Borehole Logging as an Aid in the Design of a Subsurface Pump Station	1001
<i>M. Carnevale, J. Hager</i>	
Cross-Borehole Flow Tests and Insights into Hydraulic Connections in Fractured Mudstone and Sandstone	1013
<i>J. Williams, P. Lacombe, C. Johnson, F. Paillet</i>	
Systematic Errors in Resistivity Measurement Systems	1026
<i>D. La Brecque, W. Daily, P. Adkins</i>	
Efficient 2.5D Resistivity Modelling Using a Quadtree Discretization	1034
<i>R. Eso, D. Oldenburg</i>	
Enhancing Model Reliability from TEM Data Utilizing Various Multiple Data Strategies	1044
<i>R. Jia, R. Groom</i>	
An Examination of Frequency Domain and Time Domain HEM Systems for Defining Spatial Processes of Salinisation Across Ecologically Important Floodplain Areas: Lower Murray River, South Australia	1052
<i>A. Fitzpatrick, T. Munday, V. Berens, K. Cahill</i>	
A New Radiomagnetotelluric Device for Environmental Geophysics Operating in the Frequency Range from 10kHz - 1MHz	1060
<i>B. Tezkan, A. Saraev</i>	
Mapping Fracture Zones in the Dry Creek Experimental Watershed using Seasonal Time Lapse ERT Measurements	1066
<i>T. Brosten, C. Miller, P. Routh, J. McNamara</i>	

Use of Two-Dimensional Resistivity Imaging to Optimize High Capacity Well Locations for Some of Indiana's New Ethanol Plants	1075
<i>G. Byer</i>	
Combined Straightforward Inversion of Resistivity and Induced Polarization	1082
<i>S. Niwas, P. Gupta</i>	
Electric Log Analysis of Precambrian Igneous and Metamorphic Rocks in the St. Francois Mountains, Missouri	1091
<i>P. Hutchinson, E. Stockdale, J. Charlton, R. Benitez</i>	
Monitoring Resins Injection with 3D Electrical Resistivity Tomography (ERT) using Surface and Multi-Borehole Electrode Arrays	1099
<i>F. Fischanger, G. Morelli, D. LaBrecque, M. Occhi</i>	
Application of Geophysical Methods for Geotechnical Engineering in Portugal	1107
<i>C. Yuxin, C. Dinis Da Gama, X. Qiang</i>	
Site Investigation in Urban Tunnelling using HR Seismic Reflection Survey: A Case Study	1114
<i>M. Rainone, P. Torrese, R. Madonna</i>	
An Algorithm for Waveform Inversion of Crosswell Radar Data	1125
<i>K. Ellefsen, A. Mazzella, C. Moulton, J. Lucius</i>	
Instantaneous Spectral Analysis: Time-Frequency Mapping via Wavelet Matching with Application to 3D GPR Contaminated Site Characterization	1133
<i>J. Bradford, Y. Wu</i>	
The Application of Image Processing and Analysis Algorithms to Complex GPR Datasets	1143
<i>J. Francke</i>	
A Simple New Georadar Survey Method for Bathymetric Profiling Over White Water Rapids	1151
<i>J. Arsenault, R. Paul, R. Reid, J. Cardin</i>	
Application of Frequency Response Towards Travel-Time Tomography for Detecting Soil Disturbance	1162
<i>A. Farid, A. Alshawabkeh, C. Rappaport</i>	
Gravity and GPR Investigations for the Hydrogeologic Determination of Aquifer Properties	1173
<i>J. Kick, D. Kutrubes, M. Denham, K. Dowty</i>	
Microwave Dielectric Measurements for Soil Density and Moisture Content Inference in Engineering Applications	1184
<i>A. Farid, A. Alshawabkeh, C. Rappaport</i>	
Investigation of the Electromagnetic Properties of Magnetite as a Function of Grain Size	1196
<i>B. Hamm, D. Stillman, G. Olhoeft</i>	
Buried-Channel Imaging using P- and SH-Wave Shallow Seismic Reflection Techniques, Examples from Manitoba, Canada	1203
<i>A. Pugin, J. Hunter, S. Pullan, T. Cartwright, M. Douma, R. Good, R. Burns</i>	
Marine Resistivity as a Tool for Characterizing Zones of Seepage at Lake Lacawac, PA	1212
<i>M. Heaney, J. Nyquist, L. Toran</i>	

Noise Cancellation and Low-SNR 2D/3D Imaging Methods for Multi-Channel Surface NMR Groundwater Investigations	1223
<i>D. Walsh</i>	
Magnetotellurics: What You Need To Know	1230
<i>T. Asch</i>	
Research on Dispersion Curves of MASW	1252
<i>Y. Luo, J. Xia, J. Liu, Y. Xu, Q. Liu</i>	
Surface Wave Testing to Investigate the Nature of Roller Determined Soils Stiffness	1261
<i>N. Ryden, M. Mooney</i>	
Seismic Investigations in Residential Area Liquefied by Mid Niigata Prefecture Earthquake	1268
<i>K. Hayashi, M. Tamura, N. Cristian, Y. Kikuchi, K. Ando, Y. Ito</i>	
Delineation of an Old Coal Mine in an Urban Environment with Surface Wave Seismics using a Landstreamer and Laterally Constrained Inversion	1276
<i>R. Wisen, M. Linden, M. Svensson</i>	
Application of the Wiener Filter to Total-Field Magnetic Data for UXO Detection	1284
<i>T. Meglich, Y. Li, L. Pasion</i>	
ALLTEM UXO Detection Sensitivity and Inversions for Target Parameters from Yuma Proving Ground Test Data	1295
<i>D. Wright, C. Moulton, T. Asch, P. Brown II, M. Nabighian, Y. Li, C. Oden</i>	
Tools for Assessing Geophysical Survey Data Quality	1309
<i>R. Lahti, D. Tyrer, M. Blohm, K. Valder, P. Sirls</i>	
High-Accuracy Posititoning for Geophysical Target Characterization	1322
<i>T. Faulkner, D. Taylor, C. McNeill, S. Chestnut</i>	
Inversion-based UXO Discrimination: Utilizing the Magnetic Multipole Response	1329
<i>D. Sinex, Y. Li, D. Yule</i>	
Author Index	