Contents

Preface vii
Acknowledgements viii

Section 1: Introduction
D. M. McCANN, M. G. CULSHAW & P. J. FENNING: Setting the standard for geophysical surveys in site investigation 3

Section 2: Standards and practice
R. D. BARKER: Electrical imaging and its application in engineering investigations 37
D. BEAMISH, D. CLASEN, P. G. GREENWOOD & R. J. PEART: Novel regularized inversion of VLF(R) data and coincident radar sections over a probable fault affecting Carboniferous sedimentary rocks in the Saar region, Germany 45
V. CUÉLLAR: Geotechnical applications of the spectral analysis of surface waves 53
R. A. VAN OVERMEEREN: Imaging groundwater ‘steps’ in push moraines by georadar 63
A. ROUSEAU & D. JEANTET: Some improvements in the processing of borehole acoustic signals for the characterization of geological structures 75
S. NARAYAN & M. B. DUSSEAULT: Resistivity (Ω-method) method for environmental monitoring: a new approach 89
A. P. BUTCHER & W. S. A. TAM: The use of Rayleigh waves to detect the depth of shallow landfill 97
J. D. MCNEILL: The application of electromagnetic techniques to environmental geophysical surveys 103
M. C. MATTHEWS, V. S. HOPE & C. R. I. CLAYTON: The geotechnical value of ground stiffness determined using seismic methods 113
P. J. FENNING & B. S. WILLIAMS: Multicomponent geophysical surveys over completed landfill sites 125

Section 3: Site investigation
S. J. CARTMELL, P. J. CONN & T. D. PUGH: An example of the use of crosshole tomography in dam wall foundation studies 141
I. BISHOP, P. STYLES, S. J. EMSLEY & N. S. FERGUSON: The detection of cavities using the microgravity technique: case histories from mining and karstic environments 153
L. CORIN, I. COUCHARD, B. DETHY, L. HALLEUX, A. MONJOIE, T. RICHTER, & J. P. WAUTERS: Radar tomography applied to foundation design in a karstic environment 167
D. DEMANET & D. JONGMANS: Seismic tomography survey under the La Gileppe Dam 175
S. J. EMSLEY & I. BISHOP: Application of the micro-gravity technique to cavity location in investigations for major civil engineering works 183
C. L. ROBERTS & S. G. LEWIS: Resistivity sounding: two case studies from the Cretaceous Chalk at Boxgrove, West Sussex and Barnham, Suffolk, UK 201
P. J. BRABHAM & R. J. MCDONALD: The potential of on-shore high-resolution shallow seismic techniques when applied to coastal site investigation 211
C. COVI & J. W. C. JAMES: The use of geophysics in the design and construction of the new airport at Chek Lap Kok, Hong Kong 223
J. RIGBY-JONES, M. C. MATTHEWS & P. W. MCDOWELL: Electrical resistivity imaging systems for ground investigations, with particular reference to dissolution features in Chalk areas 235
P. D. JACKSON & D. M. MCCANN: Cross-hole seismic tomography for engineering site investigation 247
Section 4: Rock mass assessment

F. L. PAILLET & R. H. MORIN: Hydraulic tomography in fractured bedrock aquifers using high-resolution borehole flowmeter measurements 267
J. P. BUSBY & R. J. PEART: Azimuthal resistivity and seismic measurements for the determination of fracture orientations 273
G. W. WON & R. W. J. RAPER: Downhole geophysical investigations for a proposed deep highway cutting adjacent to a rail tunnel at Murrurundi, NSW, Australia 283
B. T. A. J. DEGEN, J. HERBSCHLEB & P. M. MAURENBRECHER: Shallow over-water seismic reflection surveys for determining inland waterways sediment distribution in The Netherlands 293
A. P. GUNNING, R. A. PEARSON & S. J. EMSLEY: The acquisition of geophysical wireline logging data as part of the UK Nirex Ltd investigations of a potential radioactive waste repository at Sellafield, Cumbria 299
S. L. SHEDLOCK: Integrated study of fracture systems in southern Zimbabwe 307
P. STYLES, I. BISHOP & S. TOON: Surface and borehole microseismic monitoring of mining-induced seismicity 315
J. C. R. ARTHUR, G. PHILLIPS & C. R. MCCORMICK: High-definition seismic for Channel Tunnel marine route 327
M. G. NORTON, J. C. R. ARTHUR & K. J. DYER: Geophysical survey planning for the Dounreay and Sellafield geological investigations 335

Section 5: Laboratory studies

I. R. MCDERMOTT: The use of shear wave transmission as a non-destructive tool to assess the soft soil stiffness in dredging applications 347
K. MIDTOMME, E. ROALDSET & P. AAGAARD: Thermal conductivities of argillaceous sediments 355
M. A. GORDON & C. R. I. CLAYTON: Measurement of stiffness of soils using small strain triaxial testing and bender elements 365
S. GUILLAUME, J. DU MOUZA, & J. BRULHET: The use of ultrasonics to monitor long-term creep tests of salt rock samples 373

Section 6: Advances in the seismic refraction method

I. E. STEWART, J. R. WILLIAMS, & C. S. WALKER: Seismic refraction in relation to geotechnical information for (road) construction contracts 383
C. S. WALKER & M. A. WIN: A new standard in the practice of engineering seismic refraction 391
T. M. LEUNG, M. A. WIN, C. S. WALKER & R. J. WHITELEY: A flexible algorithm for seismic refraction interpretation using program REFRACT 399
C. HORRENT, S. BROUYÈRE, D. DEMANET, T. MIChIELS & D. JONGMANS: Seismic refraction survey in Bernburg, Germany: an application of the generalized reciprocal and phantoming methods 407
T. M. LEUNG: Evaluation of seismic refraction interpretation using first arrival raytracing 413

Section 7: Summary and conclusions

A. P. ANNAN: Engineering and environmental geophysics: the future 419
M. EDDLESTON, D. M. McCANN, J. C. Cripps & P. JOHNSON: Modern geophysics in engineering geology: an overview 427

Index 433