Contents

Introduction
M. G. Culshaw, J. C. Cripps, F. G. Bell & C. F. Moon: Engineering geology of Quaternary soils: I. Processes and properties ........................................ 3
F. G. Bell: Engineering geology of Quaternary soils: II. Methods of treatment ........................................ 39
M. A. E. Browne: An introduction to the geology of central Scotland ................ 63

Keynote address
P. G. Fookes: Quaternary engineering geology ................................ 73

Session 1: Glacially derived deposits
(a) Processes and material properties
Report on Session 1a by Dr N. G. T. Fannin ........................................ 101
F. G. Bell: A survey of the geotechnical properties of some till deposits on the north coast of Norfolk ..................................................... 103
F. G. Bell & A. Forster: The geotechnical characteristics of the till deposits of Holderness ..................................................... 111
B. D. Bone, D. Long & M. S. Stoker: The influence of stratigraphy on the variation in geotechnical properties of the offshore Quaternary succession, Scotland ..................................................... 119
D. M. Cruden & P. C. Tsui: Some influences of ice thrusting in geotechnical engineering ..................................................... 127
C. Harris: Glacially deformed bedrock at Wylfa Head, Anglesey, North Wales .............. 135
D. Hossain & D. G. McKinlay: The influence of fissures on the consolidation of a glacial till ..................................................... 143
M. A. Paul & L. M. Jobson: Geotechnical properties of soft clays from the Witch Ground Basin, central North Sea ..................................................... 151
M. S. Rosenbaum & R. L. Stevens: The application of stochastic modelling to the evaluation of ground conditions in Late Quaternary sediments in Goteborg, Sweden ..................................................... 157

Discussion of Session 1a ..................................................... 171

(b) Engineering implications
Report on Session 1b by Dr J. A. Little ........................................ 183
G. Butenko & S. R. Østmo: The importance of multidisciplinary geoscience investigations for engineering projects in the Oseberg, Brage and Troll Fields ..................................................... 195
G. A. Cochrane & P. G. Carter: Highway embankment construction across the Strathearn buried valley ..................................................... 203
A. J. Cooper: Waste disposal site selection techniques in Quaternary terraine Ontario, Canada ..................................................... 211
B. J. Gregory & A. L. Bell: Geotechnical properties of Quaternary deposits in the Belfast area ..................................................... 219
A. Marsland & J. J. M. Powell: Field and laboratory investigations of the clay tillus at the test bed site at the Building Research Establishment, Garston, Hertfordshire ..................................................... 229
G. D. Matheson & J. Oliphant: Suitability and acceptability for earthworking with reference to glacial tillus in Scotland ..................................................... 239
N. S. Robins & D. F. Ball: Groundwater in the Quaternary deposits of Scotland: A valuable resource and a potential engineering hazard ..................................................... 251
R. L. Stevens, M. S. Rosenbaum & L. G. Hellgren: Origins and engineering hazards of Swedish glaciomarine and marine clays ..................................................... 257
J. P. Sully & R. G. Canepanella: Lateral stress measurements in a glaciomarine silty clay ..................................................... 265

Discussion of Session 1b ..................................................... 271
Session 2: Periglacial and slope processes

Theme lecture "Periglacial and slope processes" by Prof. J. N. Hutchinson

(a) Processes and material properties

Report on Session 2a by Dr K. D. Privett
F. G. Bell & J. M. Coultard: The Trees laminated clay
T. P. Gostelow, R. J. O. Hamblin, D. I. Harris & D. W. Hight: The influence of late and post glacial slope development on the engineering geology of Wenlock Shale near Ironbridge, Salop
P. G. Kalaugher & P. Grainger: The influence of changes in sea level on coastal cliff instability in Devon
D. Long: The identification of features due to former permafrost in the North Sea
C. D. Parks: A review of the mechanisms of cambering and valley bulging
A. W. Skempton, D. Norbury, D. J. Petley & T. W. Spink: Solifluction shears at Carsington, Derbyshire
T. W. Spink: Periglacial discontinuities in Eocene clays near Denham, Buckinghamshire

(b) Engineering implications

Report on Session 2b by Dr D. J. Petley
M. E. Barton, G. J. Evans, S. B. Haji Yusof & Ho Wai Kin: The in situ density and shearing resistance of the Hampshire Basin Plateau Gravels
J. D. Lewis: Glacigenic soils of the Taft Valley, South Wales: their geomorphology, geology and engineering properties
D. C. Starr & A. A. Muironey: Ground investigation, design and construction monitoring of a full-face tunnel drive in layered Quaternary deposits
M. D. Wright: Pleistocene deposits of the South Wales Coalfield and their engineering significance

Discussion of Session 2a

Discussion of Session 2b

Session 3: Non-glacial processes and deposits and Quaternary engineering geological mapping

Theme lecture "Tropical processes causing rapid geological change" by Prof. G. E. Blight

(a) Tropical processes and deposits

J. R. Cook & J. S. Younger: Highway construction aspects of the Quaternary engineering geology of West Java
M. G. Culshaw, K. J. Northmore & P. R. N. Hobbs: Undisturbed pit sampling of tropical red clay soils
G. Guorui: The distribution, formation and engineering properties of Quaternary regional sediments in China
K. Sirwan, A. H. Majeed & B. A. Wadood: Consolidation characteristics of gypsiferous soils

(b) Quaternary engineering geological mapping

M. A. Browne & A. A. McMillan: British Geological Survey thematic geology maps of Quaternary deposits in Scotland
J. D. Cornwell & D. M. McCann: The application of geophysical methods to the geological mapping of Quaternary sediments
E. F. J. de Mulder & R. Hillen: Recent developments in engineering Quaternary geology in the Geological Survey of the Netherlands
M. A. El-Sohby & S. O. Mazen: Distribution and verification of Quaternary deposits in the Cairo area
P. G. Marinos & G. S. Xidakis: Engineering geology and mapping of the Quaternary deposits of the city of Xanthi, N. Greece
P. M. Maurenbrecher & R. Kronieger: Mass classification of Quaternary gravel deposits
S. Penn: The geophysical investigation of Quaternary geological environments
F. Schokking & B. Hoogendoorn: Computer aided compilation of settlement maps for the provinces of Friesland and Gelderland, The Netherlands
F. S. Stewart: An evaluation of seismic and borehole data available from onshore and offshore site investigations of relict glaciated areas

Discussion of Session 3a
### (b) Temperate processes and deposits

<table>
<thead>
<tr>
<th>Topic</th>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td>Report on Session 3b by Dr D. F. T. Nash</td>
<td>597</td>
</tr>
<tr>
<td>T. H. Al-Dabbagh &amp; S. Q. Al-Naqib: Tigris river terrace mapping in northern Iraq and the geotechnical properties of the youngest stage near Dao Al-Qamar Village</td>
<td>603</td>
</tr>
<tr>
<td>I. D. Clarke, K. Roose &amp; W. Riemer: Protection of the Pleistocene sediments along the rim of the San Jacinto reservoir in Bolivia</td>
<td>611</td>
</tr>
<tr>
<td>C. V. Constantinidis, N. Sabatakakis &amp; G. Tsiambaos: Engineering geological aspects of the Quaternary deposits of an urban area in southwest Greece</td>
<td>619</td>
</tr>
<tr>
<td>D. Cook &amp; G. Pereira: Records of settlement of the M5 motorway over the Somerset Levels</td>
<td>627</td>
</tr>
<tr>
<td>H. Kotera, T. Sakemi &amp; T. Matsui: A precompression method of soft ground improvement using dewatering</td>
<td>651</td>
</tr>
<tr>
<td>M. Kovacik &amp; R. Ondrasic: The effect of Quaternary uplift on the stability of slopes in the central part of the Skorusinske Vrchy mountains in the west Carpathians</td>
<td>659</td>
</tr>
<tr>
<td>T. H. Liu &amp; X. K. Yan: An investigation of the Nanyang swelling clays</td>
<td>665</td>
</tr>
<tr>
<td>S. Okusa, N. Takahama &amp; Y. Fujita: Landslide history in a Tertiary sedimentary basin in the Quaternary in Japan</td>
<td>671</td>
</tr>
<tr>
<td>P. S. Ringrose, P. Hancock, C. Fenton &amp; C. A. Davenport: Quaternary tectonic activity in Scotland</td>
<td>679</td>
</tr>
<tr>
<td>E. I. Tkachuk: Predictive models for the engineering properties of some Quaternary clay deposits in the U.S.S.R.</td>
<td>687</td>
</tr>
<tr>
<td>L. Yu Hai: The relationship between Quaternary geology and ground subsidence for some cities in China</td>
<td>695</td>
</tr>
</tbody>
</table>

**Discussion of Session 3b**

701

**Quaternary engineering geology: A summary - Prof. D. Muir Wood**

713

**Subject Index**

717

**Contributor Index**

725