

Index

Note: Page references in *italics* refer to Figures and Tables

- adsorption forces 258
- Agassiz, Lake 48
- Alport Castles, Derbyshire 230–4, 244–5
- antenna multiconfigurations 299–312
- Athabasca, Lake 84
- automatic gain control (AGC) 20, 49, 56, 114, 134, 145, 171
- averaged spectra and envelopes 306–8

- back-scattering width 302
- Badain Jaran Sand Sea, China 222
- Balanus* spp. (barnacles) 121
- Bayerischer Wald 182, 184
- Bhangazi North, Lake 42
- Bonneville, Lake, Stockton, Utah 2, 3, 79–85
- Bonneville, Lake, delta, Utah 287–97
 - constraints on conductivity 293–6
 - constraints on permittivities from AVO modelling 296
 - direct ground-wave amplitudes 296–7
 - fine-scale layers 293
 - geological setting 288–91
 - large-scale layers 292–3
 - modelling GPR wave propagation 291–2
- breccias 212
- Brewster angle 300
- Bridges of Ross, County Clare, Ireland 234–5, 316–17
- Bridgeton Formation 68, 70
- Britannia beach fan delta 121
- Brucoli Fault 248, 252
- Burrard Inlet 112, 113, 121

- Caerwys, North Wales 213
- Cape May Formation 2, 67–75
- Capilano River 113
- capillary forces 258
- Caspe, Aragon Province, Spain 236, 237
- Castissent, Spanish Pyrenees 235–6
- Cedarville Scarp 68, 69, 74, 75
- Central Clare Group 316, 318
- Central European Highlands 181–8
- Chara* 212
- Cheakamus Rivers 89, 95
- Cheekye fan, British Columbia, Canada 87–97
- Chena River permafrost wells 280–1
- Chugach Mountains, Alaska 200
- circular cylinders, polarization scattering by 302
- Clinocardium* spp. (mussels) 121
- Cohansey Formation 68

- common mid point (CMP) 15–17, 49, 91–2, 102, 104, 129, 171–2, 171, 209–10, 262
- conglomerates 212
- Conn's method 245
- Cordilleran Ice Sheet 113
- Cow Peel Bridge, Scottish Borders 228–31, 231
- Cypress Creek, West Vancouver, British Columbia 111–25
 - depositional and geomorphical environments 117–21
 - beach zone 120–1
 - channel zone 120
 - delta front 121
 - delta plain 117–20, 118–19
 - location map 112
 - macro-tidal fan deltas 122
 - physical setting 112–13
 - proposed depositional model 122–3
 - radar facies of fan delta 114–17
 - sea-level change and fan-delta evolution 121–2
 - sea-level history 113–14

- Danish North Sea coast 56–65
 - geomorphological and geological settings 56–7
- Dead Sea transform 247
- Death Valley 97
- Delaware Bay, New Jersey, USA 67–75
- dense non-aqueous phase liquid (DNAPL) spills 276
- depolarizing reflectors 302–4
- dipoles, directional properties 300
- distal outwash fan 3
- Duluth, Minnesota 84

- El Camp Fault 249–50, 250
- El Jardin, Spain 222
- electromagnetic (EM) pulse 10

- Fairbanks, Alaska 275–85
 - Chena River permafrost wells 280–1
 - Fox permafrost tunnel 281
- fault resolution 247–54
- Fichtelgebirge 182
 - Häuselohhe 186–8, 187
 - Seelohe 184–6, 186
- field capacity 258
- finite-difference time-domain (FDTD) modelling 4
- Flintstone Hill, Colorado, USA 48–9, 48

- Fort Wainwright, Fairbanks, Alaska 275, 276, 277, 281–2
- Fox permafrost tunnel 281
- Fresnel equations 300
- Garibaldi, Mount 88
- Gilpin peak 169
- Glacial Lake Hind Basin 48
- Gradix 1.10 software 132
- grain-size distribution (GSD) 260, 265
- Great Salt Lake 79
- Great Sand Dunes, Colorado, USA 47
Flintstone Hill 48–9, 48
- Greater St Lucia Wetland Park 42
- ground penetrating radar (GPR)
data collection and survey design 9–19
extreme environments 19
logistics and survey arrangements 17–19
topography 17
engineering and environmental applications 4
interpretation methodology 22–3
methodology 4
processing and display 19–22
reflectors 305–6
in sediments 1–3
aeolian and coastal environments 2
fluvial and alluvial fan environments 2–3
glacial environments 3
lakes 3
reservoir analogues 3–4
tectonics 4
- Gull Island Formation 316
- Hamilton, Ontario 84
- Hartheim/Herten gravel pit 105–6, 108
- Häuselohé 186–8, 187
- high-resolution seismics (HRS) 144
- highland systems tract (HST) 74
- Hollyburn Ridge 112
- Holmsland Barrier 56–65
- Howe Sound 88, 112
- Hyblean Plateau 252
- hydrocarbon-reservoir modelling 3
- icewall canyon 3
- Ijssel, River 144
- Jamuna River 131
- Jones Island, New Jersey 71, 74
- Juan de Fuca plate 88
- Kosi Bay Formation 32, 35, 39, 44
- Kugelstatt Moos 184–6, 185, 188
- KwaMbonambi Formation 32, 33, 35, 39
- Laacher See volcano 182
- Lakeside Mountains 81
- landmines 191–7
radar response 192, 194–5
- Lathkill, River 221
- Lathkill Valley, Derbyshire 213, 214, 218
- Lauder Sandhills, Manitoba, Canada 2, 47–53
lime mud 211
- lime silts and muds 212
- Maputaland coastal dunes, S. Africa 2, 29–45
development of 42–4
dune systems 33
geological evolution 31–2
geological map 31
GPR traverses across representative dune forms 34–5
Lulube extended parabolic dune 35–7, 35–6
Mbazwana hummocky dunefield 40–2
Sileza extended parabolic dunefield and gegenwalle wetland 37–9
sinuous crested transverse dune, Ozabeni wilderness area 42
Tshongwe–Sihangwane megaridge, Tembe Elephant Park 39–40
locality map 30
morphology 32–4
- matric forces 258
- Mgobezeleni, Lake 42
- microherms 211
- mines, non-metallic 191–7
- Mkuze River 42, 44
- Mkuze River valley 32
- Monsal Head 214
- Monsal Head barrage 219
- Mosquito Hill, Greater St Lucia Wetland Park 35, 42, 44
- Mseleni River 44
- Mytilus* spp. (mussels) 121
- Namurian Basin 316
- Negev Desert 247
- neural network model 260, 266, 267
- normal move-out (NMO) 235
- Nucella* (cockles) 121
- Nyquist principle 13
- Nyquist sampling interval 11, 12
- Oak Lake 49
- oncoids 211–12
- Ontario, Lake 85
- optically stimulated luminescence (OSL) 2, 70, 73–4
- organic-rich deposits 212
- Ostrach gravel pit 106, 108
- periglacial slope deposits 181–8
- permafrost 280–1
- phytoherm framestones 211
- Picea* (spruce) 113

- Piceo de Orizaba volcano 168
 planar interfaces, polarization scattering by 200–2
 Point Atkinson 120
 polarimetric measurement 310–11
 polarization match factor 309–10
 Pongola River valley 32, 39
 Port Durnford Formation 32
 proximal outwash fan 3, 161
 pseudoprofiles 308–9
Pseudotsuga menziesii (Douglas fir) 113
 Pucayune Formation 169
 Pyramid Lake, Nevada 222
- radar facies 23, 24
 radar facies analysis 24
 radar stratigraphy 23–4, 82
 radar-tomography 102
 rangeresolution trade-off 10
 Red Rock Pass 79, 81
 reflection profiling 10–15, 11
 antennae orientation 14–15, 15
 antennae separation 13
 length of time window 13
 line location and spacing 13–14
 operating frequency and transmitter power 10–11
 step size 11–13
 time sampling interval 13
 trace stacking 15
 regressive systems tract (RST) 74
 repetitive reflections 287–97
 Rhine glacier 99–109
 Hartheim/Herten gravel pit 105–6, 108
 Ostrach gravel pit 107, 108
 Saulgau gravel pit 107, 108
 Rhön 182
 Ries Crater, Germany 219
 rock glaciers
 application of GPR 169–71
 formation of 168
 model for formation 176–7
 significance of 167–8
 Ross Formation, County Clare, Ireland 315–26
 GPR acquisition and testing 317–18
 GPR fixed-offset profile 320–1
 techniques to calculate site velocities 318–20
 CMP 318
 vertical radar profiles (VRPs) 318–20
 3-D model building 321
 Torkeal Bay and Bridges of Ross, County Clare, Ireland 234–5
 Ruidera pools 221
 Rush Valley 79, 83
- San Juan Formation 169
 San Juan Mountain 168, 169
 Sangre de Cristo Mountains, Colorado 167
 Saulgau gravel pit 107, 108
 scattering polarization loss factor (SPLF) 301
 Seelohe 184–6, 186
 seismic stratigraphy 24
 Sevilleta National Wildlife Refuge, New Mexico 192
 Ship Creek Reservoir, Fort Richardson, Alaska 199–206
 location map 200
 study area 200–1
 Sibaya, Lake 30, 37, 44
 Sibayi Formation 32
 side swipe responses 22
 Sileza Nature Reserve 35, 37, 38
 Skeiðarársandur, Iceland 3, 153–65
 depositional environment on jökulhlaup outwash fan 156–7
 GPR profile sections and facies interpretations 157–64
 November 1996 jökulhlaup 154–6
 Sneffel, Mount 169
 Sodwana Bay 30
 Souris River 47, 48
 South Saskatchewan River 2, 127–40
 field methodology 129–31
 field site 128–9
 GPR in active channel bars 138–9
 interpretation 135–8
 location 128
 processing methodology 131–5
 background removal 133–4
 band-pass filtering 133
 dewow filtering 133
 elevation statics and depth conversion 134
 gains 134
 migration 134
 time-zero correction 132
 velocity analysis 134
 spatial filtering 21
 spherical and exponential gain compensation (SEC) 20
 Squamish River valley 88, 89
 St Lucia, Lake 32
 Superior, Lake 85
- Tanagro Valley, Italy 222
 Tembe Elephant Park 34, 35, 39, 40
 temporal filtering 20–1
 Test, River, Hampshire
 Bossington field 215–17, 217, 220–1
 Tiebridge Farm 217–18, 218, 220–1
 tufa systems 208–22, 210
Thuja plicata (cedar) 113
 time domain reflectometry (TDR) 258, 263–4
 time zeroing 22, 209
 tomographic inversion 227
 Tooele Valley 79, 80, 85
 Topp equation 10
 Torkeal Bay 234–5, 238

- transgressive ravinement surface (TRS) 70
transillumination 10
Tsuga heterophylla (western hemlock) 113
Tsuga mertiana (mountain hemlock) 113
tufa systems 207–22
 autochthonous deposits 211–12
 lime mud 211
 microherms 211
 oncoids 211–12
 phytoherm framestones 211
 classification 208
 detrital deposits 212
 breccias and conglomerates 212
 lime silts and muds 212
 organic-rich deposits 212
tuning effects 4
- vadose zone, sedimentary structures in 257–71
 GPR synthetic modelling 269–70
 thin sections, analysis of 264–9
 dielectric properties 268–9
 estimated small-scale water-retention
 characteristics 266–8
 image analysis 264–6
 water retention 258–60
Van Genuchten function 259
velocity sounding 10, 15–16
Veluwe Ridge, The Netherlands 143–50
 post-glacial evolution 149
 sedimentary facies in push moraines 145–8
 synthesis of glaciotectonic architecture 149–
 50, 149
- Ventas de Zafarraya Fault (VZF) 248, 250–2,
251, 253
vertical radar profiling (VRP) 3, 16, 225–45
 acquisition and parameters 227–8
 air-wave velocities 236–8
 Alport Castles, Derbyshire 232–4, 245
 average velocities compared with CMP gather
 velocities 238–40
 Caspe, Aragon Province, Spain 236, 237
 Castissent, Spanish Pyrenees 235–6
 Cow Peel Bridge, Scottish Borders 228–31,
 231
 ground-wave velocity variations 238
 lithological analysis 240–3
 theory 225–7
 Torkeal Bay and Bridges of Ross, County
 Clare, Ireland 234–5
vertical seismic profiling (VSP) 235
- Waalre Formation 149, 149
Wide-Angle Reflection and Refraction (WARR)
15, 16
Wye, River, Derbyshire
 Netherdale Farm 213–15, 215, 219–20
 tufa systems 208–22, 209
 Upperdale field 212–13, 213, 214, 218–19
- Yankee Boy Basin, Colorado, USA 167–77
 application of GPR 169–71
 composition and inner structure 174
 geological setting 168–9, 169
 gross features 174–6
zero-offset profile (ZOP) method 276, 280