Index

Page numbers in *italics* refer to figures, those in **bold** refer to tables

abrasions 41, 130, 133, 136, 337
  aeolian 131, 150
  aeolian, of quartz particles 129–37
  discussion and implications 131–7
  experimental procedure 129–30
  of loess crusts 166
  of soil crusts 142
  sub-aqueous 304
  sub-aqueous edge 304
  wind 298
accommodation zones 55
  aeolian 161
  of dust 157–68
  encouraged by vegetation 349
  lateral 76, 77
  loess 163
  vertical 77, 152, 216, 227
  American deserts 350–1
accumulation of clay 180
adhesion ripples 241
adhesion structures 256, 265
Adrar Bous, south central Sahara, sediments 105–23
geological history 106–9
Holocene lakes and associated mollusca 118–20
location 105–6
palaeoecological implications 117–18
Quaternary sediments 109–117
  stable isotope ratios of the Holocene gastropods 120–3
aeolian activity 369
aeolian overprint 338
aeolian processes
  importance of 302
  Mars 353
  aeolian shape sorting 298
  aeolian terrains 187, 188
  aeolian transport 1, 287, 302, 304, 327
  aeolian/fluvial interactions 264–5
  aeolianite bedforms 239
  aeolianite hydrocarbon reservoirs, economic potential of 247
  aeolianite sequence, core facies log 238
  aeolianites 31, 33, 46, 311
  cold-climate, S. Australia 233–47
  aeolianite depositional setting 245, 247
  aeolianite facies, Merrimelia Formation 237–48
  aeolianite sequence, geometry of 243–5
  Merrimelia Formation 233–5
  Merrimelia Formation of the Merrimelia Field 235–7
  paraglacial, Australia 3
  potential hydrocarbon reservoirs 244
  aerial photography 2
  aerodynamic lift 142
  African plate, N drift 107
aggradation 14, 17, 46, 47, 88, 89–90, 91, 93, 99, 102, 117
  American fans 97
  vertical 256
  aggregates, silt-sized 172
  aioum (artesian springs) 321, 322, 329, 332, 376, 378
  airborne salts 149
  sources of 139–40
  Air, the 106, 109
  akle 205
  algae 142
  Algodones Dunes, California 344, 350
  alluvial fan dissection 87–102
  distal fan trenching, controls on 91, 93–8
  fan morphometry 90–1, 92, 93
  Quaternary alluvial fans of SE Spain 89–90
  alluvial fan morphology, western Sharqiya 33–48
  Fan System I 33, 35
    morphology 35
    palaeohydrology 38, 43–46
    sedimentology 35–41, 43
  alluvial fans 20, 28, 55, 57, 82, 109, 144, 233, 349
  aggrading 87
  American Southwest 97
  apices of 28
  encroaching on to playas 379
  models 87
  occurrence of ephemeral streams 83–4
  piedmont 47, 123
  Qatar 366
  Quaternary 102
  sedimentary sequences 99
  small scale 266
  see also fans
  alluvial plain 47
  alluvial terrace deposits, Adrar Bous 110
  alluvial valleys, relict 344
  alluvium 158, 346, 348, 349
  calichified 344
alteration
  chemical 48, 150
  *in situ* 47
  clay minerals to kaolin 180
  diagenetic 43, 48
  of feldspar 310
  amphibolite 106, 107
  anatase 180
  angiosperms 202
  angular deviation 262, 263, 264, 265
  anhydrite 2, 73, 74, 77, 199, 201, 202, 365
  anorthosite 107
anticlincs
  collapsed and faulted 324
  Variscan 251
aquicludes 322, 329, 332
aquifers
  current recharge 330
aquifers (cont.)
Damman limestone 201
hydrochemistry 330-1
Kuwait 201
Neogene 201
S Tunisia
Complex Terminal 322, 327, 329, 330, 331
Continental Intercalaire 322, 329, 330, 331
Saharan 122
Saudi Arabia 201
Arabia 2
Arabian desert 31-49, 157, 205-12, 361-6
Kuwait 187-202
Arabian Gulf 187, 189, 199
archaeological sites, dust accretion 165
aridity 1
episodic, E Sahara 351
Pliocene-Pleistocene and Holocene 351
see also desiccation
arkoses 109
armour layers 7, 15, 337
sub-armour layers 7, 8, 15
armouring 8, 337
granule 349
Arroyo de los Frijoles, New Mexico 11, 12, 15
arroyos see ephemeral streams
artefact assemblages, prehistoric, as zone markers 118
artefacts 46, 47, 48, 351
Acheulian 337
Acheulian, Upper, and Levallois-type 111
Aterian Levallois-type, derived 114
Levallois–Mousteroid 111
Neolithic 114, 352
Palaeolithic (Late) and Neolithic 337
Stone Age 110, 338, 351
World War II 351, 353
Neogene 89
basin polarity, changes in 58
basin subsidence, active 53
basins
artesian, Bas Sahara 321-2, 323
closed, base-level instability 60
cratonic, peri-atlasic 324
Danish sub-basin 84
montane drainage 369
NF German, Permo-Triassic 69
rift
ard-zone continental 57
main supply of sediment 58
saddle 55, 61
infilling of 66
dedimentary, Koobi Fora 58-9, 60, 62
basanite 192
beaches, Qatar 365
bed material 8
bedding, deformed 213, 225
bedform hierarchies 288
bedform spacing-to-height ratio 270
bedforms
aeolian, migration of 261
Martian 354-6
migrating 216
sub-aqueous 237
zibars (California) and giant ripples (Sahara), characteristics compared 349, 350
bedload 7
bedload in desert streams 7-15
depth of burial 11-12
downstream dispersal of sediment 8-11
vertical displacement 11
vertical exchange 12-14
bedload discharge 7
Beer Sheba (Be’er Sheva) basin 8, 163
beetles 199
Benin Formation 174, 176
Benue Trough 53
Besor Valley, Negev 163
bicarbonate 148
Biomphalaria 122
bioturbation 63, 195, 265, 351
blistering, thin salt crust 378
Bodele Depression 171
Botswana 295
boundary friction 161
bounding surfaces 216, 217, 218, 220, 221, 223, 224, 225, 226, 240, 243, 257, 259, 261, 270
trough-shaped 221
braided plains 189, 201, 243, 245
Iceland (sandur plains) 245, 247
braided stream deposits 90, 100, 174
braided streams 84
breccia
cobble-boulder 251
diatomaceous 115, 116
brines, capillary 199
Bulinus 122
Index

Bunter Sandstone Formation 69
   Tender area
   depositional system 82–3
   genetic facies associations 74–80, 84
   sediment-body composition 80, 81
burial 9
   depth of 12

calcarenites 363
calcite 148, 172, 190, 192, 321, 333, 365
   overgrowths, rhizoliths 314
calcite micrite 202
   calcium carbonate and plant root fossilization 311
calcrite 2, 36, 201, 202, 366
   immature 265
canonical correlation 300, 301
capillary fringe 198
capillary rise 195, 198
   formation of gypsum nodules 198
capillary zone 192, 199
   carbonate 148, 150
   nodular 145
   pedogenic 251
   carbonate coating 339
   Carbonate Compensation Depth 179
carbonate horizons 145
   carbonate rocks 17, 21
case hardening 40
catchments, Turkana and Tanganyika 57
cement
   amorphous silica 150, 314
   calcite 35, 41, 47, 190
   selective dissolution of 245
   carbonate 35, 150
   halite 148
   iron oxide 215
   quartz 215
cementation 2, 35, 46, 152, 350
   channel-bed 31, 33
   sand-ripple laminae 349
   cementing agents 142
   Chad Basin 182
   chalk 157
   change detection imagery 371, 373
   channel bed 11
   channel capacity 48
   channel choking 82, 83
   channel deposits 74
   fluvial 224
   massive sandy and stratified silty 77–8
   sandy
   fluvial 224
   stratified 74–7
   superimposed 35
   channel downcutting, local 47
   channel flow 80
   channel gradients 46
   channel gravels 33, 97, 100
   cementation of 48
   channel lag deposits 74
   channel morphology 10
   channel patterns 43
   radiating 82
   channel planform, meandering 48
   channel scour 75
   channel slope 90, 93, 97, 98, 100
   channel systems 46
   braided 46
   raised, Oman 31–49
   source area 88
   channel width 91, 98
   characteristics, SE Spain alluvial fans 95–6
   channel-bank sections 111
   channels
   abandoned 78
   drainage area 91, 92, 93
   on crusted fans 91
   fluvial 253
   headcut 94, 96
   meandering, discharge-form relations 45
   modern 21
   scoured 94
   trench 88
   chemical etching 304
   chemical modification 302, 304
   chemical signature, Martian ripple blankets 356
   chemical solution 298
   chemisorption 301–11
   chert 40, 157
   worked 46
   Chew Bahir 59
   chloride 148
   chlorininity, for anhydrite stabilization 199
   Chott (el) Djerid 322, 324, 372
   changes in the central playa 379
   geomorphic, hydrologic and vegetated character,
   sample sites 377
   surface texture, surface composition and aeolian
   activity 375–8
   Chott (el) Fedjajid-Djerid Basin 321
   chotts
   see also playas
   chute channel plugging 78
   Cima Volcanic Field, Mojave Desert 165
   clasts
   clay 215, 224
   intraformational 74
   clay 161
   gypsiferous 327
   mixed-layer 179
   red 109
   clay accumulation 180
   clay coatings, root channels 177–8
   clay fraction, dust fall-out 172
   clay layers 174
   clay mineral formation 152
   clay minerals 35, 145, 148
   clays
   lacustrine 109
   swamp clays 109
   cliff retreat 379
climate 189
  arid 189
  extremely arid 17
  extremely arid to arid 27
  hot desert 361
  pre-Saharan 324
climatic change 60, 178
  recorded by sequential isotope measurements 122
climatic fluctuations 325
  late Quaternary, Adrar Bous 118, 119
  Pleistocene and Holocene 325
  Quaternary 90, 100, 102, 105, 165
cold 235
core claying upward sequence 87
cobble beds/layers 41, 111
  basal 117
cobble gravels 35
cobbles and pebbles 25
  sorted and stratified 27
colluvium 17, 157, 346
correnctions 115, 118
calcareous 114
columnar 304
conglomerate 62, 233, 235, 241, 251, 322, 327
  ancient, conditions of deposition 14
  intraformational 73, 74
  petromict 243
continental fragmentation 53
ContinentalIntercalaiire Formation 108
ContinentalTerminale Formation 109
convective uplift 171
Cooper Basin 233, 234, 253, 243, 245
coral reefs 365
cracking, thin salt crust 378
Crassula 373
creek 287, 351, 356, 357
  along interdune corridors 288
creep load 299
  crest lines 263
  sinuous 261
crest, active 286
crestal instability 211
crestal sands 290
Cretaceous sea 109
crevassesplay channels 78
cross beds, stacked sequences 240, 243
cross-bedding 41, 70–1, 78, 174, 215, 237
  carbonate chenier beaches 365
  climbing ripple 77
  foreset 35
  low-angle 71, 74, 77
  medium to high angle 227
  small-scale 71, 74, 75, 79, 217
  trough 35, 71, 75
  trough-formed 217
  high-to-medium-angle 215, 226
  multidirectional 218
cross-laminations 70, 71, 73
  climbing-ripple 198, 202
cross-sets, backflow 71
cross-strata 187
  climbing 261
cross-stratification 260, 261

Index

shadow dunes 195–7
trough-formed 222
crustal evolution 53
crustal extension 54–5
crusted fans 88, 97

crusts 349
  abrasion of 142
  calcite 42
calcrete 88, 90, 100, 102, 321
  clay 147
dune sand 148
gypcrete 321
gypsum 190, 192, 197, 198
  halite 365
  loessial 161
  abrasion of 166
  salt 375, 378
  thin 376, 378, 379
  soil 148
  surface 147
cumulative grain size–frequency plots 287
current ripples 224
cut-and-fill structures 351
cutans 314
Cutties Hillock Sandstone Formation 214
cyclones and dust storms 143
cystoliths 317

Darcy–Weisbach friction factor 44
Dead Sea 161
debris blankets, Mars 354
debris flows 23, 25, 27, 90, 91, 100
debris, coarse 66
decalcification 145
decomposition 41
decomposition theory 273
deflation 1, 41, 43, 46, 47, 48–9, 106, 118, 142, 192, 193, 199, 201, 202, 337, 349
differential 31
dust 139
  from playa surfaces 369
  of sabkha pans 90
deflation corridor 197
deflation hollows 201
deforation 241, 241
  of avalanche deposits 237
  by fluidization 240
  compressional 243
  soft-sediment 216, 240
deforiation structures 214, 215, 216, 217, 219, 220, 224, 225–6
  large 216–17, 218, 221
  small 225
  soft-sediment 265
degradation 17
deltas 55, 60, 82, 118
  Tula Bor 64
depocentres 54, 65
deposition 28, 57, 117
distal 88
dry dust 144
Index

deposition (cont.)
dust 143–4, 145, 157, 166–7
effects on sand dune dynamics and dune sand
diagenesis 147–62
measurements, modern settings 166
fines-rich 100
fluvial 10, 267
fluvio-glacial/glaciolacustrine 243, 244
from waning currents 78
sandy alluvia 106
sheet-flood 100
sieve-lobe 93
depositional processes 87
Gondwanaland glaciation 237
depositional settings
cold-climate aeolianite 245, 247
glacigenic and paraglacial 237
deposits
aeolian 369
alluvial 17, 171, 337, 356
Timna Valley 21–5
deltaic 174
fluvial 257, 258
fluvialite 14, 17–28, 109
fluvio-lacustrine 109
island basin 69
Qatar depression 365
sub-glacial 245
desert dust see dust
desert margins 144
desert morphology 2
desert pavement 20, 161, 162, 164, 349
Pleistocene 159
desert sand grains, rounded outline 129
desert sediments, rift basins 53–66
half-graben sedimentation: a case study 58–63
rift structure and geomorphology 54–6
riifting and regional drainage 57–8
desert terrains 157, 163–4
desert varnish 40, 43, 339, 346, 363
deserts
cold 1
hot ix
hyper-arid 147
semi-arid, Libyan Pre-Desert 274–8
semi-deserts 1
tropical 1
desiccation
Pleistocene/Holocene 153
salt crust, summer 378
desiccation cracks 74, 77–8, 346, 348
Devonian 1, 3
Devonian sediments 251
dew etching 41
dewatering 239, 240, 241
diagenesis 40, 48, 309, 321
silica 309–10
sub-aerial 152
diagenetic alteration 43, 48
diagenetic precipitation 193
of gypsum 201
diagenetic processes 2
diagenetic replacement 3
diagenetic veins 243
diamictites 233
diatomite 109, 114
diatoms 117–18
Dibdibbah gravels/plain 189, 201
diffusivity, turbulent 142
Digital Terrain Models 207
Dingle Group 251
Diplometopon zarudnyi 199
dipmeter readings 80
disconformity, aeolian 337
discordances, angular 240
discrimination analysis 299–301
multiple 299–300
discrimination, depositional
environments, Mega Kalahari 293–304
disintegration 363
dispersion
of dust 142–3
fluvial 11
longitudinal 9
dissection 89, 90, 97
of channels 43
distal 100
tectonically induced 99
style of 90
dissipation structures 241
dissolution 148, 192
of quartz 174
of silica 129, 131, 136, 310–11
dolerite 107
dolomite 17, 148, 157, 324, 330, 365
Turonian 322
domes 65, 107
N. Kenya 54
regional 55
draas 213, 226, 261, 263–4, 281–90
drag velocity, critical 140
drainage
axial 57, 58, 65, 87, 98
inverted 31
saddle 55, 57
drainage lines, fossil 293
drapes 74, 78, 147
siltstone 265
Du Boys equation 44
dune activity, L Chad area 182
dune aprons 218, 220, 222
dune bodies, compound/complex 261
dune cross-profile, morphological zones 286
dune field aprons 351
dune fields 348
active
Iceland 247
Kobuk Dunes National Park, N Alaska 246, 247
intracrater, Mars 354
peri-glacial 1
present 346
dune flank deposits 229
dune form, controlled by factors other than grain size
288
dune geometry and grain size 288
dune height 195
dune memory 207–8, 211
Index

dune mobility 209–10, 212

dune network patterns 208

dune networks 205–12

notation system for network dune systems 207–8

preliminary analysis, dune network dynamics 208–211

study areas 205–7

dune sands 146, 148

fining from base to crest 285, 288

linear, N Negev 152

and rain penetration 147, 148

white 114

dune sequences, ancient 1

dune systems, high memory 207–8

dune trains, migratory 337

dune types 261

depositional model 226–7

dunes 2, 109, 147

active

low and high memory 207

Ras Dnabdhub 205, 207, 208, 209, 210

aeolian, migration of 254

barchanoid 247, 264, 288

barchans 118, 348, 363

grain size analysis 275–4, 276

Selima Sand Sheet migration rates 348

trains and migrating fields 340, 346

climbing, mass-size distributions 277, 278

complex (draa) 281–90

complex star

and associated aeolian bedforms 213–30

migrating 221, 222–4, 226

recognition of 229

stationary 226

crescentic 216–17, 217, 218, 220, 221, 225, 226–7, 228, 229, 261, 264, 267

ancient compound 213

compound 263

migration of 267

crested 71

degraded 344

ferruginous 114, 116

fixed 171

formation of 1

fossilized 293

growth and migration of 348

internal stratification 237

linear 150, 152

longitudinal 208, 218, 224, 363

lunettes 192, 293

Martian 354

mega-barchans 205

mega-ridges 205, 207–8, 208

migration of 75, 147, 218, 229

competitive 224

simple 264

Namib, sand source 281, 283

nodal 208, 212

reversing 216, 218, 220, 221, 226–7, 229

ridges 208

Urayfat Irq 207, 208, 209–11

seif 208, 212, 275–6

shadow 192, 193, 194, 195, 197, 199

biomodal cross-strata 197

silicified 363

stabilization of 118

star-dune arm 217–18, 218–21, 224–5

transverse 205, 212, 261, 363

transverse ridges 208

duricrust 190, 202, 364

Qatar 366

dust 131, 136, 139, 140, 143, 171, 176, 363

aeolian 174

airborne, Holocene 152

blowing dust 139

clayey and ferruginous, deposition of 172–3

common constituents of desert dust 140

cosmic 139

defined 157

erosion of 144

ferruginous 172–3

major source areas and transport directions 141

particle-size distribution 171–2

sources of 139–40

present time and Pleistocene 181–2

suspended 143

wind-blown 173

Pleistocene 177

dust accretion

average rates 163

decline during Holocene 165

Mojave Desert 165

in the Negev 157–68

environmental setting 157–8

in gravelly (Reg) soils 158–62

in loessial terrains 162–3

dust accumulation rate 144, 145

dust deposition 143–4, 144, 145

effects on sand dune dynamics and dune sand diagenesis 147–52

dust devils 142, 143

dust dispersion 142–3

dust haze 139

dust infiltration, depth of 147–8

dust particles

entrainment of 140–2

mineralogical stratification after infiltration 148

dust penetration 161

dust plumes 143, 171

dust storms 139, 143, 144, 166, 171, 369

Kuwait region 189

Mars 354, 356

dust transport and deposition in deserts, mechanics of 139–53

desert sediments, nature of airborne additions 139

dust deposition 143–4

effects of on sand dune dynamics and dune sand diagenesis 147–52

dust dispersion 142–3

entrainment of dust particles 140–2

loess formation, arid and semi-arid areas 144–6

sources of dust and airborne salts 139–40

dust traps 157, 159

dust-haze material, very fine 172

Eastern Region (Sharqiya or Wahiba) Sands 205–12

Egypt 337, 346, 356
Index

Egyptian Desert 2
energy gradients, former 45
entrainment velocity, threshold 142
entrainment, initial rates 10
environmental changes, Quaternary 27
environments
aerial 134
alluvial 33
depositional environment, discrimination of, Mega Kalahari 293-304
desert process 426
fluvioglacial 243
interdune 218
paraglacial 245
sabkha, modern 187
of Tunisian spring mounds 321-5
vadose, desert 152
ephemeral channels 7
ephemeral flows 60
channelized 78
ephemeral stream deposits 225
ancient, Tender area, Denmark 69-85
anhydrite 74
depositional system 82-3
genetic facies associations 74-80
genetic setting 69-70
geological setting 69-70
sedimentary facies 70-4
ephemeral streams 1, 7, 8, 10, 57, 66, 109, 157, 226
ephemeral channels 7
ephemeral flows 60
channelized 78
ephemeral stream deposits 225
ancient, Tender area, Denmark 69-85
anhydrite 74
depositional system 82-3
genetic facies associations 74-80
genetic setting 69-70
geological setting 69-70
sedimentary facies 70-4
ephemeral streams 1, 7, 8, 10, 57, 66, 109, 157, 226
ephemeral streams 1, 7, 8, 10, 57, 66, 109, 157, 226
ephemeral streams 1,7, 8, 10, 57, 66, 109, 157, 226
evolution events 8-9
sporadic sediment supply 60
vertical exchange, coarse particles 12-14
epidote 150
Ermprunya Sandstone 353
erg 264, 265
Irish 270
see also sand seas
erg development 266
erg sequences 257-64
marginal 264-5
erosion 27, 62, 167, 172, 267
active, playas 379
by scouring 142
episodic 27
fluvial 106
pre-Quaternary 338
gully 118
vertical 117, 118
wind 142, 355
of soils and sediments 139
erosion surface 20
erosional blowouts, nebkhas 195
erosional surfaces see bounding surfaces
escarpments 20, 22, 46
aeolianite 47
retreating 20
evaporation 1, 35, 58, 148, 189, 198, 324, 331, 332, 333
exceeding precipitation 189
and precipitation of salts 365
subterranean water 330-1
evaporite minerals 189
evaporites 2, 66, 148, 202
evapotranspiration 17
exfoliation 43, 363
faceing 41, 43
facades models, ephemeral streams 69
factor analysis 272
fan aggradation 47, 48
changes in palaeoflow conditions 46
progressive 47
fan behaviour, classification of 88
fan degradation 47, 48
fan delta/playa boundary 373
fan deltas 61, 65
lacustrine 245
fan development 33
fan downcutting 48
fan morphometry 100
fan sedimentation 47
fan slopes 87, 91, 93, 98, 100
and drainage area 92
fan surface-channel profile relationships 88
fan terraces 28, 46, 47
concept of downstream convergence 28
fan trenching, distal, controls of 91-8
fan-head slopes, critical 88
fan-head trenches 87, 97
fan-head trenching 87-8, 90
tectonically induced 88
fanglomerates 109
fanlobes 83
fans 65
aggrading 98
crusted 91, 94
distally trenched 99
sheet-gravel 100
submarine 55
terminal 69, 82
see also alluvial fans
fault patterns 54
rifts 55
fault scarps 55
fault zones 332
El Hamma 330
faulted margins 61
faulting 58, 109
influence on topography 54
listric, complex 65
on one rift margin 54
faults 20, 235, 329
antithetic and synthetic 55, 57
boundary 55
barriers to drainage 57, 58
listric 65
listric 55
synthetic 58
Tender area 82
transfer 55
Faya Largeau, Sahara, source area Harmattan dust and haze 171, 181
feldspar 172
alteration of 310
decomposition 180
Index

Fennoscandian Shield 69
ferruginous nodules 114
fines 65, 130, 135, 159, 161, 295
decline in quantity produced 131
infiltration of 363
production of 131
silt-sized 136
fining upwards sequences 75, 77
Makaranda fan 83
fish vertebrae 114
flank deposits 215, 216
flasers 74
flash floods 57, 105–6, 338
suspended sediments 57
flood events 10
flood flow, rapid downstream decay 82
flood plains 21, 25, 27, 28, 157, 163, 168
aeolian deposition 164
Nahal Besor 163
flood trajectories 15
floods 7, 27
desert 7, 15
duration of 27
in ephemeral streams 77
multiple 78
flora, xeric 109
flow depths 46
flow pattern, nebkhas 193–5
flow resistance 46
flow separation 197, 198
flow structure, vegetation 194, 195
flow velocity 44
flows
channelized 85
fluctuating 261
hyperconcentrated 73–4, 77, 78, 85
deposits 83
overbank 85
subcritical 71
subterranean, aquifers 330
fluid turbulence 74
fluidization and deformation 240
fluting, upper dunes 211
fluvial bar migration 75
fluvial deposition 43, 69, 267
fluvial distributary system 251
fluvial erosion 106
fluvial palaeogeography, Galtymore Formation 266
fluvial process, arid streams 7
fluvial regimes, Holocene 27–8
fluvial systems 20
fluvial transport 40
fluvialite deposits 14, 109
S’Negev 17–28
alluvial deposits 21–5
environmental setting 17–20
geomorphic evolution 20
landscape morphology and reconstruction of alluvial surfaces 20–1
fluvialite entrenchment 48
fluvioglacial systems 245
foraminifera 148
foreset bedding, low-to moderate-angle 240
foreset dip dispersion 262
foreset orientation, ancient dunes 228
foreset
bimodal/polymodal 216
climbing-ripple 346
giant-scale 220
fossils, dinosaur 109
frictional drag 140, 143
Frodsham Sandstone Formation 229
Froude number 44–5, 45–6, 46
fungi 142, 147
Galtsee Mountains, Ireland 251, 252, 254, 267
Galtymore Formation 251–67
Galtymore Mountain 252
gamma logs 81
garnet 327
gases 139
gastropods, Holocene, Adrar Bous 120–3
gatch 190
geochemical cycling 139
geomorphic regime, Timna valley 24
geomorphological change
classification, Tunisian Chotts 373
detection of 371–2
playa basins 372–9
playas 380
problems involved in monitoring 370–1
gibbsite 179
Gidgealpa Group 233, 235, 237
Gidgealpa-Merrimelia-Innamincka (GMI) Trend 235
 glaciation 48, 233
gleying 117
Gobi Desert 168
graben 233
buried 109
see also half-graben; rifts
grading, inverse 240, 258
grain flow 255, 256
grain modification during transport 299
grains, transport of 299
grain segregation 197
grain shape 298–9
grain size
bimodal distribution, Selima Sand Sheet 346, 348
deposited dust 144
mean 284
progressive change across-dune 286, 289
grain size analysis 274–8
grain size distribution 295, 344
illustrations of methods used 274–8
mixed 274
response to process 288, 290
Selima Sand Sheet 349
smaller scale 286
statistical analysis of 271–8
statistical description and modelling of sand-mass size data 271–4
grain size segregation 240
grain size and sorting
complex linear dune, pattern of variation 284–7
interdune variations 287
related to process 287–9
Index

grain sphericity 298, 299, 300
interdune troughs 302
grain-fall deposits 255
Mars 356
grain-flow laminations 255, 261, 264
grain-on-grain impact 302
grain-size parameters 301
affecting factors 290
bivariate plots 295-6, 297
linear dunes 282
variation of with time 289-90
grain-size values, regional 287
grain-size variation, complex linear dune 281-90
grain-surface textures 302, 304
grainfall 197, 240
grainfall deposits 197, 243
grainfall laminae/laminations 197, 239
grainfall strata 215, 224
grainflow toe pinch-outs 264
grainflow units 261
grains, millet seed 302
Grand Erg Oriental 322
granite 106, 107
Granite Knoll (Adrar Bous) 111, 117
granules 24
gravel bars 25, 27
gravel beds 22
ancient 14
gravel plains 187, 199
gravel ridges, linear 35
gravel sheets 31
gravel spreads 35
gravel-bar and swale topography 159, 161
gravel-bed streams, arid zone 14
gravelly alluvium, coarse, as dust trap 158-9
gravelly colluvia 163
gravelly mantle, as a dust trap 163-4
gravelly terrains 157
graves 40, 62, 117
ferruginous 177
fluviatile 109, 201
ophiolite 47
weathering of 161
gravity seepage 148
groundwater 48
capillary concentration 193
fluctuating, highly-charged with silica 309
isotopic composition, Kuwait 200, 201
low salinity 192
movement of, Complexe Terminale aquifer 330
sabkha pan 201
chemistry of 201
low salinity 199
saline 365
strong mineralization of, S Tunisia 330-1
groundwater chemistry, sabkha pans 200, 201
groundwater salinity 331
grus grains (quartz) 136, 137
gullyling 27, 118, 166, 167
gymnosperms 202
gypcrete 201, 324
gypsiferous growth 41
gypsum 2, 148, 161, 190, 193, 195, 196, 197, 201, 321,
324, 333, 365, 366, 378
diagenetic 202
grain corrosion 198
nodular 198, 199, 201
precipitation of 85, 201
gypsum veins 198
Haboobs 143
haematite 150, 152, 312, 314
half-graben 65
half-graben sedimentation: a case study 58-63
the faulted margin 61
the roll-over 62-3
halite 2, 148, 192, 324, 329, 378
crystallization of 198
halophytes 192, 193, 199, 201, 202, 329
halophytic succulents 373
hamada plain sediments, Qatar 363
hand-axes, Upper Acheulian 111, 115, 116, 117
Harmattan 143, 171
Harmattan dust 181, 182
Harmattan dust fall-out 173
clay content 171-2
Sierra Leone Rise 181
headcut channels 90
headcuts 91
intersection-point 88
upper 93
heavy mineral analyses 299
heavy mineral concentrations 312
heavy mineral studies 293
heavy minerals 148, 299, 300, 363
herders, Neolithic 118, 122
histograms, natural log, grain size analysis 275-6
Hofuf Formation 366
Hoggar, the 109
Holocene 27
Hoopeman Sandstone, complex star dunes 213-30
horizons
eeluvial 172
illuvial 172, 177-8
hornblende 150
human activity
and blowing dust 142
disturbing natural state 157
humidity, relative 162, 189
hunters and fishers 118
Hydrobia 119-20
hydrocarbon exploration 2
hydrocarbon plays, Cooper Basin 243
hydrocarbon potential, Gidgealpa group, basal
sediments 235
hydrocarbon reserves 233
hydrocarbon reservoirs 2
hydrocarbon traps, potential 243
hydrograph recession 7
hydrological regime
and salt transport 375
seasonal 372
hydrological relations, aquifers
aquifer hydrochemistry 330-1
losses: past and present 330
storages 329-30
hyperarid conditions 351
hyperarid core, N Africa 337
igneous rocks 17, 24
illite 2, 35, 172, 180, 312
illuviation 177–8
image registration, scene-to-scene 371
images, difference/ratio/sequential 371
impact pits 302
implements
Aterian 111
and Levallois-type, derived 115–16
Neolithic 351
incision 28, 46
periodic 47
within the flood plain 27
industrial assemblage, Levallois–Mousterian 117
infiltration
dust and silt particles into Selima Sand Sheet 349
dust, depth of 147–8
rainfall 159
water, modified by fines 161
infiltration water 164
infrared bands 370–1, 372
interbedding
aerol and fluvioglacial sediments, Merrimelia
dune field 247
eaerolitesites 243
close-set 63
interdune areas 256, 257, 264, 267, 344
migration of 261, 264
interdune basins 349
interdune corridors 286, 288, 344
interdune flats 218, 226, 229, 240
interfluves, Negev desert 144
interparticle cohesive force 142
intersection point scour 90, 93, 94
intersection points 87, 91, 93, 94, 97
migration of 20
secondary 88
intersection-point trenching 98
thresholds 88
intertidal flats 365
intraclasts 63
intr sets, sandstone units, ascending 218, 220
inversion point 142
iron 150
precipitation 118
reduction of 117
iron content, Harmattan dust 181
ironstone
lateritic 171, 177
nodular 116
irrigation 374
irrigation tunnels (foggaras) 329
irrigation waters, need to maintain flow 333
jet stream 143
joints 225, 226

Index

Jordanian Desert 157
Judean Desert 28
K-feldspar 148
Kalahari (Mega) Desert 293–304
Kalahari sand 293, 294, 301
general characteristics 295–6
origin unclear 302
Kamasia Fault 57
kaolin 178, 180
kaolinite 148, 172, 312, 314
Karman–Prandtl velocity law 44
kart 366
kaolitization 332
Khabrats 189
Kino Sogo 59
Kuiseb Valley 281
kurtosis 271, 273
size frequency distribution 285
Kuwait 187–202
Kuwait Group 90
Laburr Fault 59
lag (gravel) deposits 187, 189
lag pavement, smooth 356
lake deposits 66
lake levels, high 325
lake sediments 59–63
fine 61
lakes
Baringo 57
Bogoria 57
Chad 171
Holocene 123
Adrar Bous, associated sub-fossil mollusca 118–20
mollusca 118–20
Lisan 161
Tanganyika 55, 56, 57
Turkana 55, 56, 57, 59
changes in level 60–1
desert 1
laminae/laminations 74
flat-beded 345
foreset 261
horizontal 71, 74, 78, 79, 217, 253, 356
inverse grading 254, 256
lenticular 254
pairs, cyclic, concordant 346
plane-bed 69, 84, 256
wind-ripple 237, 239, 240, 241, 243
Landsat data/images 369, 371, 379
Selima Sand Sheet 338–9, 341, 344
Landsat mosaics
Chott (el) Djerid area 323
L Turkana 59
landscape evolution
chronological implications 48
palaeohydrological and palaeoclimatic implications 48
Laplace densities, log skew 274–5, 278
mixed 275, 277
single 277
Laplace distributions, log skew 274
Laplace model, log skew 272–3
laser granulometer 295
lee eddy 194, 195
leucoxene 215
lichens 147
lift forces 142
lignite 174, 176
limestone 17, 40, 157, 366
Cretaceous 322
Miocene 46
pseudo-oolitic 363
Upper Sennonian 322, 330
Limonum 373
liquefaction 226, 240
lithic clasts 266
lithofacies
aeolian, Galtymore Formation 252–7
fluvial, Galtymore Formation 252
lithofacies sequences, Galtymore Formation 257–65
lithosols, desert 158
loams 117
Adrar Bous 110, 111, 115, 116
green 114
vertisolic 118
loess 131, 136, 137, 153, 166
accumulation of 163
fluvialite reworking 163
formation in arid and semi-arid areas 144–5, 146
reworked 164
loessial terrains 164
dust accretion 162–3
vegetated 157
log hyperbolic densities 273, 274
log hyperbolic parameters 272
Lookout Hill (Adrar Bous) 111, 117
Lough Muskry Formation 252
lower plinths 218
Lymnae 120, 122
Magnus effect 134
Malaspina Glacier 245
mamalhat (pan) 189
Manning equation 44
marine deposits 106
marls 109, 157, 366
Mars, ripple blanket 353–6, 357
mass movement 173, 178
mass-size distributions 274
meander, radius of curvature 45
meander wavelength 35
megaripples, granule 341, 343
megaripple deposits 71
crested 72
megaripple migration 75
Melanoides tuberculata 114, 120, 122
Merrimelia Field 235–7
seismic facies 242, 244–5
Merrimelia Formation 233–47
metasediments 106
mica-schist 107
micrites 43, 192
microgranite 107
microliths, stone 114
migmattite 106
migration surfaces 240
millet seed grains 302
minerals in sabkha pans, vertical distribution 191
mobility, desert veneer 339
Mohave/Mojave Desert 165, 349
moisture and dust accumulation 144
moisture regime, changes in 152
mollusc shells, freshwater 116
Mollusca, non-marine, Holocene, Adrar Bous 120
montmorillonite 35
Moray Firth 213
Moray Firth Basin 213–30
morphometric contrast, American and Spanish fans 97–8
mottling 117
mud cracks 251
mudclasts 74
intraformational 72, 77
mudflats 82
mudrocks 235
glacio-lacustrine 233–4, 247
muds, lacustrine 123, 202
mudstones 78, 80, 83, 233
and siltstones 74
Multispectral Scanner (MSS) 338–9, 369, 370, 372
Munster Basin 251, 253, 266, 267
Nahal Avrona 28
Nahal Hebron 8–15
Nahal Nehushtan 17, 19, 20, 28
Nahal Yael 8–15
Namib Desert 1, 213, 226–7, 281–90
Namib Sand Sea 281
Nappamerri Trough 233, 235
Navajo Sandstone 353
nbak see nebkhas
nebkhas 187, 189, 192–5, 192, 201, 202, 363, 369, 374, 375
destruction of 202
and shadow dunes, diagnostic sedimentary structures 195–8
Negev Desert 8–15, 17–28, 144–5, 157–68
Nehushtan Basin 17
Neolithic burials 110
Neolithic hearths 111
Neolithic middens 111
Niger Delta 176
Nigeria 171, 178, 182
Nitraria retusa 192, 193, 194, 195, 198, 201, 202
North Africa 2
Nubian Formation 346
oases, Fedjadj and Neftzaoua 321–3
Ogwashi–Asaba Formation 174
oil 2
oil and gas reserves 53
Index

Old Red Sandstone 1, 251, 252, 267
Olympus Mons, Mars 354, 356
Oman Mountains 31
ophiolite 40
organic material 63
organic matter 178, 195, 197, 197, 199
outwash fans 243, 245
braided 235
fluvio-glacial 244
NE Alaska 245
outwash plains 245
overbank deposits 43, 63, 78-9, 84
overbank flow 80, 84
overbank sheet flooding 80
overland flow 164
oxidation, by meltwater underflows 235
oxides, iron 176
oxidizing conditions 117
palaeo-environmental and landscape change, W Sharqiya 41, 47-8
palaeo-lake, Adrar Bous 120
palaeochannel sequences 40
palaeochannel systems 31
palaeochannels 33, 35, 37, 43, 46
exhumation of 31
palaeoclimates 17
palaeocurrents 253, 258, 263, 265
Galtymore Formation 252
Tender area 80
palaeo-discharge, determination of 45, 45-6
palaeoflow 38, 44, 76, 254, 259, 264, 269, 270
estimation 43-5
indicators 33
parameters 43-6
velocities, determination of 44-5
palaeohydraulic models, application of 43
palaeolake beds 293
palaeosols 27, 164
argillic 27
calcareous 163
loessial 163
palaeowaters 201
palaeowinds 216, 263, 265
and complex star dunes 227-9
and palaeoclimatic, Galtymore Formation 265-7
similarities E Greenland/Scotland 229
as Trade Winds 229
Palmyra palm 317
palygorskite 35
particle burial 10
particle entrainment 130
particle fall velocity 142
particle flux 130
particle migration, repeated 354
particle movements 10
particle outline changes 131
particle sifting, worms and ants 181
particle size distribution 295
particle transport 130
particles
biogenic 139
course
depth of burial 11-12
vertical exchange 12-14
vertical displacement 11
parting lineation 71
Patchawarra Trough 235
pebble beds 27
pebble depth 15
pebble gravel 339
pebble lag 43, 202
pebble stringers 351
pebble-ripple 339
pediment surfaces 89
pediments 20, 109, 114
pedogenesis 117
pedogenetic horizionation 144, 145
pedogenic horizons 23
pedogenic modification 145
pedogenic processes 159
pelagic deposits, N Atlantic 179
pelites 251
Penrith Sandstone Formation 152
percolation 329, 330
upward 322
permeability 159, 247
anisotropic 247
Permian Yellow Sands, England, draa 213
permineralization 309, 317
phytoliths (stegmata) 317
piedmont zone 33
Pigeon Rock Formation 251, 267
plagioclase 148
planar lamination 351
plane-bed lamination 256
planebeds 71
plant roots, mineral replacement of in dunes, SE India 309-18
field observations 312-14
regional geology and stratigraphy 311-12
rhizolith analysis 314-17
playa basins 321
sediment transfer processes, remote sensing of 369-80
playa grooves 379
playas 144, 157, 199
annual changes 378-9
environmental setting of 372
gemorphological changes on 372-9
see also Chott (el) Djerid; Chott (el) Fedjadj; Chott el Guettar
pluvial periods
Arabia 201
Holocene, E Sahara 351, 353
Pleistocene 201, 351
Quaternary 330, 338
point bar deposits 77
point bar migration 77
pollen, fossil xerophytic 109
polygonal folding, thin salt crust 376, 378
pore waters 201
porosity
gravelly soils 159
plant 194, 195
potsherds, Neolithic 115
Index

powders, erosion of 142
precipitates
chemical 3
inorganic 332
precipitation 17, 148, 163
desert, common chemical species 141
diagenetic 193
gypsum 201
in situ, calcite 192
salts 365
and washed out dust 143-4
pressure gradients 142
principal component analysis, change detection
371-2
probability plots 272
log normal 273, 275, 276
segmented, interpretation of 273
proglacial regions (past), dust accretion rates 168
progradation 88
psammites 251
pseudo-bedding, barzamanite 36
Qatar Peninsula, surficial deposits 361-6
quartz 148, 172, 178, 190, 346
silt-size 180
solubility of 310
solution of 181
quartz grains
attrition of 131-4
chemical alteration 150
euhedral evergrowths 152
rounding of 134, 136
SEM investigations 302-4
aeolian origin 327
quartzite 190
radiocarbon ages, Chott (el) Fedjadj 324
rain-wash, and fine material deposition 172-3
rainfall 8, 17, 145, 147, 153, 157, 162
and depth of dust infiltration 147-8
rainsplash 333
rainstorm 172
and deposition of dust-haze material 172
raised channels, palaeohydrology, W Sharqiya 43-6
re-entrainment, probability of 9
reactivation surfaces 264
rebkas 192
red beds 27
Innaminka 240, 243
reducing conditions 117
reflectance data, Chott el Djerid 376
reflectance values
summer 371, 374, 375
winter 373
reg deposits, Australia, source of 288
Reg soils 166
dating of 161
decreasing dust accretion with time 165
Holocene gravelly terrace, Negev, characteristics of
159, 160, 161
mature, Pleistocene alluvial surfaces 161
remote sensing 2, 369-80
and desert geomorphology 370-2
detection of geomorphological change, playa basins
372-9
replacement/petrafication zone 317
reptiles
Dicynodont 214
Permian 214
reservoir potential, aeolianites 237
reservoirs, aeolianite, economic potential of 245, 247
response diagrams 296
reworking 14, 62, 63, 66, 240, 351
cycles 62
of fluvial deposits 281
of fossils 105
Kalahari sand 293
loess 163, 164
Pleistocene 281
sheet flood deposits 202
syn- and post-depositional 144
and zibars 349-50
Reynolds numbers 140
rhizoliths
analysis 314-17
associated with latosolic weathering 317
carbonate 312, 313, 314, 316, 317, 318
defined 311
occurrence 312, 313
silica 313, 314, 316, 317
rhyolite 107, 109
ridge and swale topography 187, 188
rift basin models 65
rift marginal blocks 17, 20
rift structure 57
and geomorphology 54-6
listric half-graben model 55, 56
rifting
active 66
and regional drainage 57-8
S Negev 20
rifts
Arava Rift Valley 17
classic structural model 55
composed of segments 55
continental 53-4
ancient semi-arid and arid zone sediments 62-3
arid-zone, sedimentation in 58, 59, 65
Dead Sea 17
E African 53, 57
Gregory 57, 58
half-graben 54
as major structure 55
N Sea 54
rill erosion 379
ring complexes, Adrar Bous 105-9
Ringkobing-Fyn High 69
ripple blankets on Mars 353-6
ripple laminations
back-flow 71
climbing 70
ripple symmetry 70
ripples 348, 349
adhesion 241
climbing 350
migration of 351
ripples (cont.)
current 193, 224
ephemeral 198
giant 339, 340, 345, 346, 348, 351, 356
diagnosing sand sheets 353
Martian 354–6, 357
spacing/height ratio 344
granule 356
migration of 349–50
pebble 339, 342, 353, 356
preservation potential 198
sand 339, 351
truncated 339, 342
wind 254–5, 256
rivers
axial
Omo 59, 61
Suguta 58
increase in power of 62
Kerio 57–8
Makaranda 83
perennial, exotic 57
roll-over, importance of 58
Turkwel 58
roll-over zones, major river inputs 57
roll-overs 55, 58, 62–3
drainage 59
Kamasia 57
streams crossing 66
root decomposition, partial and poor preservation 317
root petrification 311
rotation, and grain attrition 131
roughness elements 142, 193
non-erodible 142
roundness, of grains 298–9, 300
runoff 159, 161
rutile 180
sabka deposit 69
sabkha pan groundwater, derivation of 201
sabkha pans
continental, Kuwait 187–202
groundwater table in sabkha pans 199–201
preservation potential and the geological record 201–2
regional setting, physiography and climate 187–9
sedimentary framework 189–95
sedimentary structures 195–99
inland 189–92
composition of the sediments 190–2
morphology 189–90
water table 199–201
sabkhas 1, 70, 82, 84
coastal 365
continental 187, 365
marine
Arabian Gulf 199
Holocene 189
preservation of 202
Qatar 365
sedimentary structures within 198–9

Index

Sahara Desert 1, 143, 157, 182, 322, 337–53, 356–7
Tenere 105–23, 344, 346
Saharan Boundary Fault 372
salinas see sabkhas
saline flats see sabkhas
saline precipitates and associated landforms 321–33
salinity 201
aquifers/chott surfaces 331
low, pan ground water 199
upward increase in 198
salt crust development 378
salt efflorescence 329
fresh 373
salt precipitates 142
salt transport 375
salt types, Chott el Djerid 375
salination 1, 130, 131, 142, 166, 287, 342, 348, 349,
351, 356
deposits 237, 240
Mars 353, 356, 357
processes 240
salination load 1
trapped 348
salt flats see sabkhas
salts 159, 321
dissolved 349
in precipitation 139
evaporitic 189
soluble 331, 378
sample moments 271, 272
and separate components of the mixture 273
sand accumulations, Qatar 363
sand flows 215, 216
sand samples, characterization by estimated parameters 272
sand samples, description of size distribution 272
sand seas 2, 205, 213, 226, 344
circumpolar, Mars 356
sand sheet deposits 217, 218, 219, 226, 229, 240, 337
accumulation of 202
aeolian 230
pedogenically altered 344
sand sheet/gravel sheet terrain 189
sand sheets 187, 216, 218, 227, 267, 346, 351
aeolian 69, 118
differing environments and bedforms 350
low-angle, stratified 222
Martian 354–6
and pans 190
Qatar 363
red, beneath Selima Sand Sheet 346, 348
sand and silty layers 22
sand transport, down wind decrease in, and erg development 266
sand-body geometry 82
sand-flow layers/strata 215, 218, 222, 224
sand-ridges, ferruginised 116
sand-sheet deposits 223
sand-sheet sabkhas 190
sand-sheets, E Sahara, ripple blankets on Mars 337–57
field and remote-sensing observations, Selima Sand Sheet 338–49
sand sheets (E. Sahara) (cont.)
ripple blankets on Mars  353-6
Selima Sand Sheet, problems of origin  349-53
sandflow bedding/layers/strata  215, 217, 222, 237, 239, 241, 243
sandflows  197, 243
inverse grading  240
sands  62
  aeolian  109, 111, 116, 117, 296
calcareous  363
colluvial  117
crestal  285, 290
deltaic  109
fluvial  117
gypsiferous  327
laminated  24
massive  25
red, Teri sands, SE India  312
wind-blown  116
sand sheets, and pans  190
sandstone  17, 24, 157
  aeolian  152, 215, 216
cold climate  237
channel  225
cross-bedded  176, 240
  large-scale  71–2, 74, 78
  low-angle  71, 74
  small-scale  70–1, 74, 78
cross-stratified
  large-scale  253, 257
  low-angle  254, 256–7, 264
fluvial  109
horizontal laminations  71, 74, 78
horizontally bedded/stratified  256–7, 264
laminated  218
massive  72–4, 77
multistorey  235
Nubian  19, 346
sandstone reservoirs, economic importance of  2–3
sandstone units, aeolian, Hopeman Sandstone  213–30
sand, wind-blown  363
Saudi Arabia  189, 226
complex dune bars  215, 224
schist  106
scour  7, 10
  depth of  12, 14, 15
  intersection-point  91, 93, 94, 102
  total depth  14
scour and fill  14
scour layer  8, 9, 10, 12
  degree of longitudinal mixing  10
  full redeposition of  12
  size distribution of  14
scour surfaces  78
scouring zones  93
scouring, upwind  329
sea level
  eustatic falls  174
  global rise  48
Sebkhet el Hamma  379
sediment accumulation  55
sediment sources  98
sediment supply
changes in  99
Gregory Rift  58
and stream power  88
sediment texture, influenced by source rock  24
sediment transfer, plays basins, remote sensing of  369–80
sediment transport  8
sediment yields  57
sedimentary facies, Bunter Sandstone, Tonder area  70–4
sedimentary reworking  62, 63, 66
sedimentary sections, alluvial terraces, Timna Valley  24
sedimentary sequences
  in rift basins, characteristic of location  66
  stacked  99, 100
sedimentary structures  33
sedimentation
  aeolian, Galtymore Formation, Ireland  251–267
  Galtymore Formation, lithofacies and lithofacies sequences  252–65
  palaeogeography  265–7
  regional setting  251–2
  arid-zone continental rift  58, 59, 65
  chemical/biogenic  109
  glaciogenic  245
  paraglacial  235
  patterns of  54
Quaternary  123
  rift, arid zone  63, 65–6
sedimentology, raised channel systems, W Sharqiya  41, 43
sediments
  aeolian  3, 235
  alluvial  46, 62
  ancient, concept of vertical exchange  14–15
  channel  31
  coarse  62, 66
  coastal, Qatar  365
  deep-sea, comparison with soils  179–81
  deltaic  62
  desert  2
  airborne additions to  139
  fluvial  3
  downstream dispersal of  8–11
  fluvial  235
  Qatar  365–6
  fluvioglacial  1
  glacio-aeolian  245
  glaciolacustrine  244
  Hamada Plain  363
  horizontally stratified  261
  interfluve  49
  intraclast-rich  63
  L Turkana basin  59–61
  lake  59–63
  Miocene-Recent  58
  nebkha  193
  non-marine  53
  overbank  43
Quaternary, Adrar Bous  109–17
  alluvial terrace deposits  110–11
  colluvial and aeolian sands, western valley  111
sediments (cont.)
Quaternary, Adrar Bous (cont.)
correlation of deposits round the mountain 116–17
hillslope deposits flanking Gabbro Knoll and Lookout Hill 111
lacustrine clays and diatomites, Agorass n’essouï 114–16
plains sequence 116
Selima Sand Sheet, alluvial origin 356–7
shoreline 62
suspended 57
seepage 322, 332
gravity 148
groundwater 373, 374
Selima Sand Sheet 337
field and remote sensing observations 338–49
composition and internal structure 346–9
relation of to dunes 346
variations in surface morphology 338–46
problems of origin 349–53
climatic significance 351, 353
comparison with sand sheets (zibars), N American deserts 349–51
semi-deserts 1
sequence complexity, index of (half-graben sedimentation model) 65
sequences
aeolianite 238, 243–5
aggradation 89–90
delta 63
desert and semi-desert 53
dissection 90
distal fan, inset 101
erg 257–62
marginal 264–5
glacigenic 233, 235
glaciolacustrine 235
palaeochannel 40
sedimentary
active rift fault 66
alluvial fan 98
stacked 99–100
cemented surface crusts 152
cross beds 258, 261
vertical 87
Series
Lignite 174
Pharusian 106
Suggarian 106
serir 163
sesquioxides, role of 311
sets, giant-scale 216, 218, 221, 224, 225
shale 157
shear stress 140, 142
critical 44
sheet flood deposits 189, 201
sheet flood transport 190
sheet floods 190
Shields function 44
shoreline deposits 69
siderite, diagenetic 261
Sierra Leone Rise 173, 179, 181
silcretes 131, 136, 309
silica
amorphous 309
biogenic 318
dissolved, removal of 178
opaline 317
organic complexing of 310
in plants 317
release and movement of 310
reprecipitation of 148, 150
and surface diagenesis 309
silica dissolution 129, 131, 136, 310–11
silica overgrowths 317
silica replacement 309–10, 310
silica solubility determination 130
silicate gels 148
silt 62, 161
diatomaceous 116
Nigerian Basement Complex soils 180
overbank 78
silt and clay, and discriminant functions 300, 301
silt dispersion, long-term 143
silt ripples 74
silt sheets 100
siltstones 83
low-angle laminated 77
Sinai desert 157
sinks, topographical 53
sinuosity 35, 43
SIR (spaceborne imaging radar) in E Sahara 337–8
size distribution parameters, N Namib dune 285
size frequency distribution 281
Skagerrak Formation 69, 84
skewness 9, 271, 273, 285, 295
seasonal pattern 289
sliding, on fine-grained layers 178
slip face 210, 211, 225, 229, 247, 263, 267, 354
active 287
migration 225
sip-face deposits 216, 221, 240
slope erosion and wind drag 211
slope pedimentation 173, 178
slopewash 106, 118
smectite 148, 172, 180
snails 119–20
soil associations, the Negev 158
soil crusts 142, 148
abrasion of 142
soil formation 24
soil profiles 174, 176
soil series, Nigeria
Agege 176
Ahiara 176, 180
Alagba 176, 177, 178, 179, 180, 181
Asaba 177
Kulfo 176
Owode 176, 179, 181
soil structure, older sand sheet 347
soils 144
Acid Sands 171, 172–4, 176–7, 179, 180, 181
arid climate 158
Basement Complex, Nigeria 180
and deep-sea sediments 179–81
ferrallitic 171, 172–4
Index

399

soils (cont.)
  ferrallitic (cont.)
    red 174, 178
  with hardened layers, Acid Sands areas 177
loess-rich 158
loessial 148, 165
Negev 158–62, 166
Northern Drift (W Africa) 171
old terraces, Timna Valley 27
problem of great depth 177–8
pseudo-gley 117
Reg 20, 27, 158–62, 165, 166
  Pleistocene 161
Roda soil, Qatar 365
saline, loamy 365
sandy hydromorphic 176
  W African related to geology 174–8
  and wind-blown material 171–82
wind-blown 136
solution 41
  chemical 298
  of quartz 181
  surface 43
solution rilling 41
solutional activity 304
solutional V pits 304
spalling 43
spectral reflectance, surface sediments 339, 341
sphericity of grains 298, 299, 300
splitting, in situ 43
SPOT high resolution data 370, 372, 376, 380
SPOT High Resolution Visible sensor 369
spring mounds
  degradation of 333
  development of 332–3
Fedjadj oasis 325
formation of 321
fossil 329
Nefzaoua oasis
  central 328–9
  southern 325, 327
Nefzaoua ‘peninsula’ 329
spring mounds, S Tunisia 321–33
development of 332–3
environment of the spring mounds 321–5
hydrological relations 329–31
spring mound types, Fedjadj and Nefzaoua 325–9
spring neck complexes 373
spring pot complexes 373, 374
stable isotope ratios, Adrar Bous gastropods 120–3
star dunes, complex, and associated bedforms,
  Scotland 213–30
  aeolian sandstone units descriptions and interpretations 216–25
deformation structures 225–6
geological setting 213–15
outline description and interpretation, aeolian sandstones 215–16
star-dune corridors 229
staurolite 299, 300
stone pavements 363
stratification
  aeolian, low-angle 218
  small-scale 256, 264

streaks, Mars 354, 355
stream power 27
  critical 88
  variations in 99
stream-flows, hyperconcentrated 74
streams, scarp-face 65
stress, dispersive 7, 12
subsidence 66
  basin 53
  rift valley shoulders 66
  zone of 372
subsidence cavities 329
subsoils, red 173, 177–8, 180
subtidal flats 365
Succinea 118
Sudan 337
sulphate 148
supra tidal flats see sabkhas, coastal
surface moisture and vegetation changes 373–5
surface roughness 164
surface runoff 373, 374–5
surface segmentation 87, 88
surface wash 144
surficial deposits, Qatar Peninsula 361–6
suspension 130, 134, 142, 143
  in dust storm 1
swamps 118
syenite 107
talus 20
talus aprons 20, 27
Tanganyika Basin 55, 56
tectonic control and lithofacies
distribution, Galtymore Formation 266–7
tectonic zone, active 59
tectonics and sedimentation 53–63
tectonism 60
terminal fans 82
  modern, Makaranda river 83
  Tønder area 84
terraces 21, 28, 33, 110, 114, 118
Adrar Bous 109
alluvial 24
  Negev 161
  Timna Valley 24–5, 27
cut-and-fill 99
erosional 97
flood plain (modern) 20
Holocene 20, 25, 26, 159
marginal, Chott Djerdid 324
Pleistocene 20, 26
stepped 46
  within fan-head trenches 90
textural modification, post-aeolian 302, 304
textural parameters, particle size distributions 295–8
textures and structures, selected surfaces, Timna Valley 22–3, 24–5
Tharsis volcanic province, Mars 354
Thematic Mapper (TM) images 338–9, 369, 370, 371, 372
thermal inertia 356
Thermophilum duodecimguttatum 199
Index

threshold entrainment velocity 140, 142

tillites 106, 233, 245

tills 244

Timna Basin 17

Timna Valley, S Israel 17–28

Tirrawarra Field 237

Tirrawarra Sandstone Formation 234–5, 240, 242, 244

titanium 180
toesets 218, 219, 221, 256

tollachee formation 236
tourmaline 327
toz see dust storms

traction 197, 288, 351, 354

tractive force, critical 44

Trade Winds 1

transfer zones, sedimentary function 55

transgressions 109

Cretaceous marine 108

marine 226

Zechstein 214

transmission losses 11, 35

transport

by surface runoff, playas 374–5
distance and size 9, 10

transport processes, dunes 287

trap efficiency 164, 165, 166
decline in with aridity 167

travertine 321

trenching

depth 100
distal 90, 91–8, 99, 100

intersection-point 90, 94, 98

truncation surfaces see bounding surfaces

tubules, ferruginous 114
tufa 321
tuff 107

Tunisia 3, 324, 369

Tunisian Chotts, classification of geomorphological change 373

turbulence 142

turbulent eddy activity 142

Turkana Basin 55, 56, 58, 59

unconformities 99, 106

angular 251

Hardegson 69

Upper Fars Group 33, 46

valley fill 346

vegetation 152, 157, 161, 193, 338, 350, 351

and accretion 349

and dust accumulation 144, 145

as a dust trap 162, 163, 164

and loess accumulation 153

Negev 157

sand-binding 277, 278

vegetation indices 372

ventifacts 40

vertical exchange rate

coarse particles 12, 13

equilibrium 12, 15

vertical exchange of river bed sediments 12–14

applications to ancient sediments 14–15

of coarse particles 7–8

not directly dependent on degree of armouring 8

vertisols 110, 111, 115, 116, 117

Viking Graben 53

Viking orbital images, Mars 353–6, 357

titanium 180

tozen see dust storms

transport processes, dunes 287

trap efficiency 164, 165, 166

decline in with aridity 167

Tunisia 3, 324, 369

W Shetlands Basin 55

Wadi el Amud 275

Wadi Merdum 277

wadi sediments, recent 366

wadis see ephemeral streams

Wahiba sands 31, 205–12

Warburton Basin 243

wash erosion 161, 164, 167

wash, inhibited 159

water

evaporative fractionation 122

interstitial 198, 201

term of in sediment transfer, south-central Tunisia 369

water conductivities 331

water infiltration, modified by fines 161

water table 187, 189, 192, 198, 201, 349, 350

lowering of 47, 48

rising during fan aggradation 48

role of, sabkhas and nebkhas 202

sabkha pans 199–201

seasonally fluctuating 117

shallow 259, 365

water table fluctuations 189, 199, 304

waterlogging and nebkha destruction 201

weathering 24, 145, 163, 180

acid-sulphate 174

bauxite 109

chemical 157, 161

of silicate materials 309

deep 109, 136

in situ salt 136

latosolic 317

in situ 312

mechanical 157, 159

rapid, humid, tropical conditions 174

solution 181

subaerial 43

raised channel systems, W Sharqiya 40–1

weathering profile, granite 117

weathering rate 145

Wilks' lambda test 300

wind abrasion 298

wind action 325

wind drag 211

wind energy 195

wind erosion 139, 142

Mars 355

wind regime, seasonal, Namib Desert 281

controlling dune dynamics 289
Index

wind ripples 198
climbing 254–5, 256
migration 256
wind rose, Kuwait 189
wind shear 210
wind transport, sorting 299
wind velocities 210
wind-blown materials and W African soils 171–82
comparison between soils and deep-sea sediments 179–81
soil analyses 178–9
the soils in relation to geology 174–8
source of dust, present time and Pleistocene 181–2
wind-ripple laminations 237, 239, 240, 241, 243
wind-ripple strata 215, 224
wind-scour 329
winds
affecting Tunisian playas 376, 378
Harmattan 143, 171
katabatic 143
Khamsin 349, 356–7
lee-side, helical 211
monsoon 207
oblique and vortex flow 210–11
prevailing 189–90
recirculating, Arabian Gulf 363
reversing 220
sand-moving, Mars 356
Shamal 189, 192, 196
wireline logs 237
wood fragments, silicified 109
X-ray diffraction analysis 190
X-ray diffraction studies 172, 179, 180–1
yardangs 375
Zambia 295
Zarsis Formation 322, 327
zibars 344, 349–50, 351, 356
Zimbabwe 295
zircon 299, 300