

# Index

Pages on which figures appear are printed in *italic*, and those with tables in **bold**

- abyssal currents, Nares Abyssal Plain 13, 14, 21  
abyssal hills  
  Madeira Abyssal Plain 72, 73, 114, 116  
  acoustic facies 33–4, **35**, 36, 36, 37, 54–5, 58, 59, 65  
  pore-water advection 126  
  relationship to faulting 96, 100  
  sediments 52, 62, 88, 105, 111, 160  
  Nares Abyssal Basin, geotechnical properties 136–7, 138  
  S Cape Verde Basin 37, 38  
abyssal plains  
  definition of ix  
  distribution of ix–xi, ix, x, xi  
  fans, compared 8  
  formation and development vii  
  research vii, viii–ix  
acoustic blanking, Great Meteor East 91, 92, 93, 95, 96, 98–9, 99, 103  
acoustic sounding equipment, development of viii  
advection velocity  
  Great Meteor East 119, 124, **124**, 125, 125–6, **126**, 127  
  values 113, 117  
  *see also* pore-water advection  
aegirine, Madeira Abyssal Plain 159  
African Plate boundary 51  
African (NW) continental slope 54  
  acoustic facies 34–6, 34, **35**, 36, 39, 41, 44, 45, 46  
  turbidites, source of, Madeira Abyssal Plain 114, 157, 158–9, 160, 161, 167  
Algero-Provençal Basin 1, 1  
  fan system, effect of 10  
alkali metals, Madeira Abyssal Plain 76, 76, 159, 160  
  *see also* potassium, sodium  
Alps, turbidites 71  
aluminium  
  Madeira Abyssal Plain  
  analysis 149, **151**, 181, **183**  
  profile 168, 168, **185**, 186, 188, 192, 196, 198  
  values of **185**, **209**, **210**, **211**, **212**, **213**  
  provenance, evidence of **152**, **153**, 154, 155, 156, 156, 157, 158, 159, 160, **163**, **164**, **165**  
  volcanic ash 172  
  NW Atlantic Continental Margin 226–7  
amino acids, dissolved, NW Atlantic Continental Margin 228  
Amirante Passage, deep western boundary current 23  
ammonia, NW Atlantic Continental Margin 216, 218, 224, 225, **225**, 229, **232**, **233**, **234**, **235**, **236**  
amphiboles, Madeira Abyssal Plain, turbidites 159  
animal traces, Great Meteor East  
  detection of 105, 106, **106**, 121  
  sediments, relationship to vii, 107–11, **107**, 110, **110**  
  types of 105–7, 107, 108, 109  
anoxic conditions *see* oxidation front  
Antarctic bottom water flow  
  Argentine Basin 23–4, 26, 28, 30  
  Nares Abyssal Plain 13  
Antarctic Ocean, distribution of abyssal plains ix, x–xi, x, xi  
antithetic faults, Great Meteor East 94  
apatite, Madeira Abyssal Plain, turbidites 160  
Apennines, turbidites 71  
archipelagic aprons, use of term viii  
Arctic Ocean, distribution of abyssal plains ix, x–xi, x, xi  
Argentine Abyssal Plain vii  
  benthic flow pattern, inferred from particle size analysis 23–7, 24, 25  
  sea-floor morphology 24, 26, 26, 27–8, 28, 29  
  sediment dynamics 28–9, 30  
Atlantic (NW) Continental Margin *see* Hatteras Abyssal Plain, organic carbon mass balance  
Atlantic Ocean  
  distribution of abyssal plains ix, ix, ix–x, x  
  *see also* Hatteras, Madeira, Nares, and Sohm Abyssal Plains  
augite, Madeira Abyssal Plain, turbidites 159, 160  
Azores–Gibraltar Rise 49–51, 50, 52  
  
Bahama Banks, sediment source 4, 10  
Balearic Abyssal Plain x, 1, 1, 2, 6, 6, 10  
  erosion by turbidites 7, 7  
barium, Madeira Abyssal Plain  
  analysis 181, **183**  
  profile 187, 189, 191, 194, 198, 198  
  values **185**, **209**, **210**, **211**, **212**, **213**  
basalt, Madeira Abyssal Plain  
  basement 51–2, 54, 57, 88  
  turbidites, fragments of 147, 179  
basement  
  faulting 96, 100, 100, 103  
  pore-water advection 125, 126  
  morphology 51–2, 54, 57, 59–62, 60, 61, 65, 88, 89–90, 114  
  *see also* reverse faulting  
basin plains, use of term ix, 2  
bathymetric control, turbidites 5, 5, 8, 9  
Bay of Biscay, thermal gradient 122  
benthic community respiration 83, 215, 216  
  *see also* organic carbon mass balance  
benthic flow pattern  
  importance of 131  
  *see also* Argentine Abyssal Plain  
Bermuda Rise  
  carbon mass balance 229–30, **232**  
  modelling of **221**, 222, 222, **223**, 224, 225, **225**, **226**  
  organic carbon, sedimentary 220

- Bermuda Rise (*cont.*)  
 carbon mass balance (*cont.*)  
 pore-water inorganic metabolites 218, **232**  
 respiration on the sea-floor 227  
 location and sedimentation 13, 13, 216, **216**, 217, 217
- biogenic carbonate, Madeira Abyssal Plain 180  
 biogenic methane gas, acoustic blanking, cause of 98  
 biogenic silica, Great Meteor East 76  
 biological mounding, Great Meteor East 56  
 biotite, Madeira Abyssal Plain 159  
 bioturbation  
 geochemistry, effect on 151  
 geotechnical properties, effect on 134, 135, 136, 137, 139  
 organic carbon, effect on 110, 111, 215  
 modelling, importance in 221–2, **221**, 222, 223, 226, 229  
 oxidation front, effect on 170, 171, 174, 175–6, 190, 191, 198  
 pelagic sediments and turbidites  
 pelagite filled burrows 174, 175–6, 176, 181, 184, 191, 196, 197  
 separation of 3, 72–3, 83, 84, 88, 183, 205  
 pore-water advection, effect on 121, 127  
 sedimentation rate, indication of 14  
 seismic data, effect on 46  
 volcanic ash band 184, 190
- black shales, W African Margin 98  
 Black Shell turbidite, Hatteras Abyssal Plain, volume of viii
- Blake Bahama Basin x, 1, **1**, 2  
 bathymetry, effect of 5, 5  
 sedimentary source 4
- Blake Marginal Escarpment 4, 5  
 Blake Plateau, sediment source 4  
 bottom currents  
 importance of 131  
*see also* Argentine Abyssal Plain
- bottom-water temperature, effect of 122–3  
 Bouma units, turbidites 2, 8, 73, 82, 83, 137  
 'bowstring' heat-flow probe 121–2, 122
- Brazil Basin  
 pore-water advection rate 113  
 turbidite emplacement viii, 71
- brecciation, fault zone 101  
 bulk density, Nares Abyssal Plain 133, 134, 135, 135, 136–7, 136, 137, 138
- Bullard Fracture Zone 26, 26  
 'burn-down' model 179–80  
*see also* oxidation front
- burrowing traces *see* animal traces
- caesium isotopes, use of 201  
 calcareous turbidites, Madeira Abyssal Plain 150, 151, **152**, 153, 154, 155, **156**, 157, 158, 159, 160, 161
- calcite  
 cobalt, adsorption of 203  
 dissolution 175, 176  
 foraminifera 151  
 manganese, adsorption of 153, 173, 201–3, 206  
 calcite compensation depth  
 Madeira Abyssal Plain 52, 62–3, 63, 68, 73, 147, 180  
 use of term 3
- calcium, Madeira Abyssal Plain  
 analysis 149, **151**, 181, **183**  
 profile 184, **185**, 186, 188, 193, 197, 200
- calcium carbonate  
 Madeira Abyssal Plain  
 analysis of 149, **151**, 181, **183**  
 behaviour of 200, 202, 205  
 correlation of turbidites 71, 73, 77, 80, 82, 83, 85, 147, 149–50  
 pelagic values 105, 109, 147, 180  
 profile 184, 186, 188, 190, 191, 193, 196, 197, 197, 198, 204, 204  
 provenance, indication of 151, **152**, 153, 154, 155, **156**, 157, 158, 159, 160, 161, **163**, **164**, **165**  
 stratigraphic variation 150, 180, 182, 183  
 turbidite values 105, 110, 114, **185**, **209**, **210**, **211**, **212**, **213**
- Nares Abyssal Plain vii, 14–15, 16, 17, 20, 132  
 NW Atlantic Continental Margin 216, 217, 223, **232**, **233**, **234**  
*see also* calcareous turbidites, calcite compensation depth
- California Borderland-basin plain, sedimentation rate 10
- Canary Basin, regional setting 49–53, 50  
*see also* Great Meteor East, Madeira Abyssal Plain
- Canary Current Zone, turbidites 158
- Canary Islands 50  
 source turbidites, Madeira Abyssal Plain 76–7, 159, 160, 161, 184  
 volcanism 52
- canyon systems, turbidites, use of 27
- Cape Verde, Island of, volcanism 50, 52
- Cape Verde Abyssal Plain ix
- Cape Verde Basin vii  
 acoustic facies 33–4, 37–41, 38, 40, 41, 42, 43, 44–5, 44, 46  
 early work viii  
*see also* African (NW) continental slope, Great Meteor East, Madeira Abyssal Plain
- Cape Verde Rise, unconsolidated clays 99
- carbon dioxide, analysis of 216
- carbonate *see* calcium carbonate
- carbonate banks, sea level, effect on 10
- carbonate-free basis, use of term 151, **152**, **153**
- Caribbean Sea  
 distribution of abyssal plains ix, ix, x  
*see also* Columbus Basin, Grenada Basin
- Cascadia Abyssal Plain ix, ix, x
- CCD *see* calcite compensation depth
- channel overbank deposits  
 acoustic facies **35**  
 Cape Verde Basin 35, 36, 39, 40, 42, 43, 45, 46
- channelization of flows  
 evidence of, Madeira Abyssal Plain 56  
 turbidites 6–7
- Charis Fracture Zone, Madeira Abyssal Plain 53, 54, 62
- chemical gradient, pore-water advection, determination from 113
- chemical reactions, thermal gradient, effect on 123
- chlorine concentration, sedimentation rate, evidence from 20
- Chondrites*, burrows 175–6, 175, 181, 191

- chromium, Madeira Abyssal Plain 168, 168
- clay  
 Madeira Abyssal Plain 180  
 minerals 73, 114, 153, 179, 199, 203  
 Nares Abyssal Plain 132  
 fabric 133, 141–3, 142, 143, 144, 144
- clinopyroxenes, Madeira Abyssal Plain 73, 159
- cobalt, Madeira Abyssal Plain  
 analysis of 181, 183  
 behaviour of 201, 202–3, 204, 205, 206  
 profile 184, 187, 189, 190, 191, 194, 196, 197, 198  
 values 209, 210, 211, 212, 213
- coccoliths, Madeira Abyssal Plain 77, 147, 151, 168, 179, 180
- colour, sediments  
 early work viii  
 Madeira Abyssal Plain 72, 73  
 correlation, used in 71, 77, 147  
 organic carbon, relationship to vii, 73, 168–9, 175, 183, 199–200, 205  
 oxidation front 167–8, 168–9, 169, 174–5, 174, 175, 175–6, 179, 180, 181, 182, 183, 184, 197  
 Nares Abyssal Plain 132, 137  
 turbidites and pelagites, separation of 3
- Columbus Basin ix, x, 1, 1, 2  
 sand layers, geometry of 9  
 sediment, source of 4, 10  
 turbidites, shape of 5–6, 5, 6
- compaction, geothermal gradient, effect on 123  
 compression, reverse faulting, caused by 99  
 conductive heat flux, calculation of 120–1  
 conductive–convective heat-transport, equation of 121  
 consolidation testing, sediments, Nares Abyssal Plain 133, 139–41, 140, 140, 143–4
- Contessa turbidite, Apennines 8
- continental rises, sediment source ix
- continental shelves, sediment source ix
- copper, Madeira Abyssal Plain  
 analysis of 181, 183  
 behaviour of 171, 201, 202, 203–4, 205, 206  
 profile 172, 174–5, 176, 184, 187, 189, 190, 191, 194, 196, 197, 198  
 values 209, 210, 211, 212, 213
- core-top loss, modelling of pore-water  
 metabolites 224, 225, 225, 229
- Cretaceous magnetic quiet zone, Madeira Abyssal Plain 52, 53, 114
- Crozet Basin, pore-water advection rate 113
- Cruiser Fracture Zone, Madeira Abyssal Plain 53, 54, 54, 62, 65
- current winnowing, geotechnical properties, effect on 137
- cylindrical faulting, Madeira Abyssal Plain 93, 94, 94, 96, 97, 100, 103
- Darcy's law 117
- debris flows  
 acoustic facies 35  
 Cape Verde Basin  
 acoustic facies 35, 36–7, 36, 37, 39, 40, 41, 41, 44, 45, 46  
 Madeira Abyssal Plain 52–3, 55, 56, 62, 63, 83, 59–60
- importance of 33  
 turbidites, compared viii, 2, 3, 3
- Deep Sea Drilling Project 52
- deep western boundary current 23, 24, 25, 26–7
- denitrification  
 NW Atlantic Continental Margin 218, 219, 220, 224, 225, 225  
 pore-water nitrate, evidence from 215
- Denmark Strait, thermal gradient 122
- dewatering  
 geotechnical properties, effect on 135, 137, 138, 143  
 lack of, cause of diapiric movements 96, 98  
*see also* reverse faulting
- diapirism, Madeira Abyssal Plain 96, 98, 99
- differential compaction, Great Meteor East vii  
*see also* reverse faulting
- differential consolidation *see* differential compaction
- dissolved free amino acids, NW Atlantic Continental Margin 228
- dissolved organic carbon, Hatteras Continental Rise 216, 218–9, 219, 235, 236
- dissolved organic matter, NW Atlantic Continental Margin vii–viii, 216, 218–19, 219, 227–8, 228, 229–30
- dissolved organic nitrogen, NW Atlantic Continental Margin 216, 218–9, 219, 227–8, 228, 229–30, 235, 236
- dissolved organic phosphorus, NW Atlantic Continental Margin 216, 218–9, 219, 227–8, 229–30, 235, 236
- distal-fan, relationship to abyssal plains 8
- distal turbidites, Madeira Abyssal Plain 167, 179
- drainage area 1  
 sedimentation rate, effect on 10
- drape monoclines, Madeira Abyssal Plain 94
- DSDP, Deep Sea Drilling Project 52
- East Pacific Rise, hydrothermal circulation 114, 116
- effective stress gradient, sediment, calculation of 119
- Eh changes, carbon oxidation, cause of 167, 170
- electron-acceptor zones 170
- en échelon faults, Madeira Abyssal Plain 96, 96
- Enderby Abyssal Plain ix, x, xi
- entry points, basins 3–4, 4  
 determination of 4–5  
 effect of 9, 10  
 Great Meteor East vii, 82, 85
- epidote, Madeira Abyssal Plain 159
- erosion, by turbidites 7–8, 7
- ESOPE, Etude des Sédiments Océaniques par Pénétration expedition 148
- European Plate, boundary 51
- extension, reverse faulting, caused by 99
- Falkland Fracture Zone 26, 26, 27
- fans  
 abyssal plains, compared 8  
 filter of material 10–11
- fault dip, Madeira Abyssal Plain 92, 95
- fault drag, Madeira Abyssal Plain 91, 98

- fault gouge, fault-sealing potential, effect on 101  
 faulting  
   Great Meteor East vii, 87–8, 87, 88, 89, 90, 91, 92, 95, 96, 97, 98  
     distribution 92, 96, 103  
     interpretation problems 91–2, 93, 94–5, 94  
     pore-water advection, caused by 116  
     seismic profiles, effect on 65  
   Nares Abyssal Plain 87, 101  
   *see also* acoustic blanking, reverse faulting,  
 feeding traces *see* animal traces  
 feldspar, turbidites, Madeira Abyssal Plain 74, 159, 161  
 ferromagnesian minerals, turbidites, Madeira Abyssal Plain 73–4, 159  
 flooding, by turbidites 6  
 fluid lava flows, Madeira Abyssal Plain 63  
 fluting, Madeira Abyssal Plain 56  
 foraminifera, Madeira Abyssal Plain  
   pelagites 52, 168, 188  
   turbidites 88, 147, 151, 159, 160, 179  
 fracture zones, Madeira Abyssal Plain 50, 51, 53, 54, 54, 62, 66, 68, 72, 72  
  
 Galapagos Rift, pore-water advection 113, 114, 116  
 gas, acoustic blanking, caused by 98  
 geochemistry  
   sedimentation rates, evidence from 14, 15, 17–19, 17, 18, 20, 21  
   *see also* oxidation front, provenance  
 Georgia Basin 26, 26  
 geotechnical properties  
   abyssal plain environment 131  
   Madeira Abyssal Plain, shear strength 110  
   Nares Abyssal Plain  
     clay fabric 141–3, 142, 143, 144, 144  
     consolidation-permeability characteristics 139–41, 140, 140, 141, 143–4  
     index properties and shear strength 133–9, 134, 135, 136, 137, 138, 139, 143  
     methods 132–3  
   geothermal profile *see* temperature profile  
   ‘giant events’, turbidites 8–9, 9  
 glaciation, effect on deposition viii–ix  
   Madeira Abyssal Plain 65, 71, 83, 88, 109, 114, 147, 168  
   Nares Abyssal Plain 20  
 glass shards, Madeira Abyssal Plain 75–6, 76, 147, 167  
 Geological Long Range Inclined Asdic (GLORIA), long-range side-scan sonar vii, 33–4, 49  
 GME *see* Great Meteor East  
 graben, Great Meteor East 96  
 grain size  
   Madeira Abyssal Plain  
     entry point of turbidites, evidence of vii, 77, 78, 79, 80, 82, 85  
     sediments 88, 105, 109, 110, 114, 174, 182, 199  
     seismic records, effect on 55–6, 62  
     source of turbidites, evidence of 159–60  
   Nares Abyssal Plain 132, 137  
   NW Atlantic Continental Margin 4, 216–7  
   *see also* Argentine Abyssal Plain  
  
 gravity flows  
   fan systems, effect of 11  
   sediment, source of 4  
   turbidity currents, compared 7  
 ‘gray unit’, turbidite 8  
 Great Abaco Canyon, sediment source 4, 5  
 Great Bahama Canyon, sediment source 4, 5  
 Great Meteor East, Madeira Abyssal Plain  
   geophysical surveys  
     magnetic field 53, 54  
     seabed morphology 54–6, 55, 56, 57, 58, 59, 59, 68  
     sediment thickness and basement  
       morphology 59–62, 60, 61, 68, 89  
     seismic stratigraphy 33–4, 34, 36–7, 37, 46, 62–8, 63, 64, 66, 67  
   regional setting 49  
     crustal structure and age 51–2, 88  
     physiography 49–51, 50, 72, 72, 73  
     sediments 52–3  
     seismicity and volcanism 52  
   *see also* animal traces, faulting, oxidation front, pore-water advection, turbidites  
 Great Meteor Seamount 49, 50, 51, 52  
 Great Meteor West 49  
 Great Meteor–Cruiser Seamount Chain, source of turbidites, Madeira Abyssal Plain 72, 72, 79–80, 160, 161  
 Greater Antilles Outer Ridge, sedimentation rates 13, 13, 20, 21, 131, 132  
 green tourmaline, Madeira Abyssal Plain 159  
 Grenada Basin x, 1, 1, 2, 3, 3, 4, 6, 7, 8, 9  
 Guatemala Basin, pore pressures 117  
  
 Hatteras Abyssal Plain  
   carbon mass balance vii, 229–30, 233, 234  
   carbon oxidation rate, modelling 221–6, 221, 222, 223, 225, 226  
   inorganic metabolites 218, 218  
   residence times 228  
   respiration on the sea-floor 226–7, 227  
   sedimentary organic carbon 219, 220  
   location ix, x, 1, 2  
   sediment provenance ix–x, 3–4, 4, 132  
   sedimentation viii, 1, 3, 3, 6, 7, 9, 10–11, 71, 216–7, 216, 217  
 Hatteras Continental rise and slope  
   carbon mass balance 229–30, 234, 235, 236  
   carbon oxidation rate, modelling of 221, 221, 222, 222, 225, 226, 226  
   inorganic metabolites 218, 218, 228, 229  
   pore-water dissolved organic matter 218–9, 219  
   respiration on sea-floor 226, 227–8, 227, 228  
   sedimentary organic carbon 219–20, 220  
   location and sedimentation 216–7, 216, 217  
 Hayes Fracture Zone, Great Meteor East 50, 62  
 heat flow *see* temperature profile  
 heavy minerals, Madeira Abyssal Plain 147, 159, 161, 179  
 Hecho Basin, Spain, turbidites 8–9  
 hemipelagic sediments  
   basin, importance of 2  
   turbidite oxidation, compared 180, 206

- Hispaniola–Caicos Abyssal Plain  
 location *ix*, *x*, 1, 2  
 sedimentation 1, 5, 6, 8, 9, 10, 11, 71
- hornblende, turbidites, Madeira Abyssal Plain 159
- Hudson Canyon, source of sediment 10
- Hunter Channel, Argentine Basin 26
- hydraulic conductivity  
 calculation of 117  
 Madeira Abyssal Plain 98–9, 119, 125, 127  
*see also* pore-pressure gradient, reverse faulting
- hydrocarbons, importance of abyssal plains 8
- hydrogen sulphide, Madeira Abyssal Plain 153
- hydrothermal circulation, Madeira Abyssal Plain 114, 116, 117, 125, 151
- Hyeres Seamount, debris flow 50, 52, 53
- hypersthene, turbidites, Madeira Abyssal Plain 159
- ice, Antarctic abyssal plains *xi*
- igneous basement, Madeira Abyssal Plain 51–2, 54, 57, 65, 88, 114
- illite, turbidite, Madeira Abyssal Plain 179
- in situ* heat-transfer experiment 117
- index properties, Nares Abyssal Plain 133–9, 134, 135, 136, 137, 138, 139, 143
- inorganic metabolites, NW Atlantic continental margin 218, 218, 232, 233, 234, 235, 236
- iron  
*see also* ammonia, iron, nitrate, manganese  
 analysis 149, 151, 181, 183, 216  
 geotechnical properties, effect on 135  
 profile, Madeira Abyssal Plain 180, 186, 188, 190, 191, 192, 196, 196, 205, 205, 206  
 behaviour of 199, 200, 201, 202, 205, 206  
 values of 185, 209, 210, 211, 212, 213  
 profile, NW Atlantic Continental Margin 218, 224, 225, 225, 232, 233, 234, 235, 236  
 provenance, indication of, Madeira Abyssal Plain  
 pelagites 151–3, 153, 155, 155, 165  
 turbidites 152, 155, 155, 156, 157, 158, 159, 160, 163, 164, 184
- ISHTe, *in situ* heat-transfer experiment 117
- Islas Orcadas Rise, benthic flow pattern 26, 26
- isotope stages, use of, Madeira Abyssal Plain 71, 77, 82, 83, 84, 84, 85, 181, 182
- isotopes, use of 113, 168, 170, 171, 176, 221, 223, 226
- Juan de Fuca, hydrothermal circulation 114, 116
- Kastenlot cores, animal traces 121
- laminations  
 Madeira Abyssal Plain 159, 181, 190, 191  
 Nares Abyssal Plain 137
- lead isotopes, use of, Great Meteor East 168, 170, 171, 176, 221, 223, 226
- lebensspuren *see* animal traces
- Lesser Antilles Island Arc, source of sediment 3, 4, 8
- lithium, Madeira Abyssal Plain  
 analysis of 149, 151  
 provenance, indication of 151, 152, 153, 153, 154, 156, 159, 163, 164, 165  
 profile 187, 189, 194, 198, 198  
 values 185, 209, 210, 211, 212, 213
- long-range side-scan sonar *vii*, 33–4, 49
- lysocline  
 Madeira Abyssal Plain 52, 109, 160, 176, 180  
 Nares Abyssal Plain 13, 20
- macrofaunal feeding *see* animal traces
- Madagascar Basin, pore-water advection rate 113
- Madcap area, Madeira Abyssal Plain *viii*, 71
- Madeira, Island of 50, 52  
 provenance sediments, Madeira Abyssal Plain 76–7, 159, 160, 161
- Madeira Abyssal Plain  
 age of 71–2  
 regional setting 49–53, 50, 179, 180  
*see also* African (NW) continental slope, animal traces, faulting, Great Meteor East, oxidation front, pore-water advection, provenance turbidites
- Madeira Rise, provenance turbidites 114
- Madeira–Tore Rise 50, 51
- magnesium, Madeira Abyssal Plain  
 analysis of 149, 151, 181, 183  
 profile 184, 186, 188, 193, 197, 198  
 values 185, 186, 209, 210, 211, 212, 222  
 provenance 152, 153, 155, 156, 158, 159, 160, 163, 164, 165
- magnetic anomalies, Great Meteor East 52, 53, 54, 62–3
- magnetite, turbidites, Madeira Abyssal Plain 159
- manganese  
 analysis of 149, 151, 181, 183, 216  
 geotechnical properties, effect on 135  
 nodules 55  
 profile, Madeira Abyssal Plain 169, 169, 170, 172, 180, 184, 186, 188, 190, 191, 192, 196, 196, 197, 198  
 explanation of 171–2, 172, 176, 200–2, 201, 203, 205, 206  
 values 185, 209, 210, 211, 212, 213  
 profile, NW Atlantic Continental Basin 218, 218, 221, 223, 224, 225, 232, 233, 234, 235, 236  
 provenance, Madeira Abyssal Plain 152, 153, 153, 155, 155, 156, 157, 160, 163, 164, 165
- Mariana Trough, pore-water advection rate 113
- Marnoso-arenacea Formation, Apennines, turbidite 8
- Maurice Ewing Bank, Argentine Basin, benthic flow pattern 26–7, 26, 30
- Mediterranean abyssal plains  
 distribution of *ix*, *x*  
*see also* Balearic Abyssal Plain
- Mendocino Fracture Zone *ix*
- methane gas, cause of 98
- mica, turbidites, Madeira Abyssal Plain 74, 179
- microcline, turbidites, Madeira Abyssal Plain 159
- microfossils, pore-water advection rates, determined by 113
- microplankton, turbidites, Madeira Abyssal Plain 158
- microseismic noise, temperature gradient, effect on 123
- Mid-Atlantic Ridge *viii*, 50, 51, 53, 122  
 deep western boundary current 23, 24, 26  
 seabed morphology 27, 54, 88

- mineralogy, turbidites, Madeira Abyssal Plain 73–7, 76, 114, 147, 159, 161, 179
- Mississippi Delta, pore pressures 117
- mobile sediment foragers, Great Meteor East 105–6, 107, 107, 108, 110, 110
- Mohr–Coulomb relationship, shear strength 119
- mud-wave fields, Argentine Basin vii, 27, 28–9, 28, 30
- nannofossils, Madeira Abyssal Plain 102, 188
- nannoplankton, Great Meteor East 52
- Nares Abyssal Plain
- faulting 87, 101
  - geological setting 132, 132
  - location ix, x, 13, 13, 131
  - oxidation front 137, 138
  - sediments x, 10, 13, 49, 63
  - see also* geotechnical properties, sedimentation rate
- Navidad Basin 1, 1, 2, 10
- nickel, Madeira Abyssal Plain
- analysis of 181, 183
  - behaviour of 202, 203, 205, 206
  - profile 184, 187, 189, 190, 191, 194, 196, 197, 198, 198
  - values 185, 186, 187, 188, 189
- nitrate
- Madeira Abyssal Plain profile 169, 169, 180, 184
  - NW Atlantic continental margin
    - analysis 216
    - organic carbon mass balance, determination of 215, 220–1, 221, 224, 225, 232, 233, 234, 235, 236
    - profile 218, 218, 219, 220, 220, 232, 233, 234, 235, 236
- nitrification zone, NW Atlantic Continental Margin 215, 218, 220–1, 221, 224, 225, 225, 229
- nitrogen *see* ammonia, dissolved organic nitrogen
- Nod Hill, Madeira Abyssal Plain 54–5, 58
- normal faults, Great Meteor East 92, 94, 96
- normal stress gradient, sediment, values of 119
- ocean trenches, abyssal plain formation, effect on ix, xi
- olivine, Madeira Abyssal Plain 159
- oozes, Madeira Abyssal Plain 52, 102, 155, 165, 180
- organic carbon
- Madeira Abyssal Plain
    - analysis of 149, 181
    - colour, relationship to 73, 168–9, 175, 183, 199–200, 205
    - faunal diversity, effect on 105, 110–1, 110
    - geochemistry, effect on vii, 167, 168–9, 173–4, 179–80, 200–6
    - methane gas, cause of 98
    - profile 170, 170, 171, 172, 184, 186, 188, 190, 191, 193, 196, 197, 198
    - provenance, determination of 150, 150, 151, 152, 153, 154, 155, 155, 156, 157, 158–9, 158, 160–1, 163, 164, 165
    - stratigraphy, use in 71, 77, 82, 84, 147, 150–1
    - temperature gradient, effect on 123
  - Nares Abyssal Plain 14–15, 16, 17, 20, 21, 132
  - NW African continental slope 158–9, 161
  - see also* organic carbon mass balance
- organic carbon mass balance
- NW Atlantic continental margin vii–viii, 229–30, 232, 233, 234, 235, 236
  - methods 216–7, 216
  - oxidation rate, modelling of 215, 220–6, 221, 222, 223, 223, 225, 226
  - pore-water dissolved organic matter 218–9, 219, 220
  - pore-water inorganic metabolites 218, 218
  - sedimentary organic carbon 219–20, 220
  - residence times 228, 229
  - respiration on the sea-floor 226–8, 227, 228
- orthopyroxene, Madeira Abyssal Plain 73, 159
- over-consolidation ratio, Nares Abyssal Plain 139–41, 140, 140
- overpressure generation
- acoustic blanking, cause of 96, 98–9
  - see also* reverse faulting
- oxic sediment
- use of term 167
  - see also* oxidation front
- oxidation front
- Madeira Abyssal Plain vii
    - analysis of 167–8, 168, 181, 183
    - discussion of 151, 153, 155, 198–206, 201
    - formation of 152, 167, 179–80
    - hemipelagic sequences, compared 180, 206
    - profiles, active or recent examples 168–73, 168, 169, 170, 171, 172, 173, 174, 176, 183–4, 186, 187
    - profiles, fossil examples 173–6, 175, 184–98, 186, 187, 188, 189, 192, 193, 194, 195, 196, 197, 198, 199
    - stratigraphy 181, 182
    - values 185, 209, 210, 211, 212, 213
  - Nares Abyssal Plain 137, 138
  - see also* organic carbon mass balance
- oxidation rate constant, organic carbon concentration, effect on 215
- see also* organic carbon mass balance
- oxygen
- geochemical changes, importance for 167
  - nitrate distribution, evidence from 218
  - see also* organic carbon mass balance, oxidation front
- oxygen isotopes
- ratios, determination of pore-water advection 113
  - stages, Great Meteor East 71, 77, 82, 83, 85
  - turbidite volume, related to 84, 84
- 'oxygen limited model', Emerson 219
- Pacific Ocean
- abyssal plains, distribution of ix
  - sediments, organic carbon 215
- palaeontology, sediment correlation 71, 77
- particle orientation, Nares Abyssal Plain 141–3, 142, 143, 144
- particle size analysis, benthic flow pattern, evidence of 23–7, 24, 25
- particulate organic carbon, carbon mass balance 215, 223, 226–8, 227, 229

- pelagic sediments  
 abyssal hills 52, 88, 105, 160  
 basin fill, importance in 2, 3, 3  
 bioturbation and pelagite filled burrows 174, 175–6, 175, 181, 184, 190, 191, 196, 197  
 animal traces 107, **107**, 109, 110–1, 110  
 calcium carbonate 105, 109, 114, 147, 150, 151, 153, 154, 155, 180, 182  
 colour 72, 132, 147, 174, 175, 180, 182, 184, 197  
 correlation 71, 73, 74, 75, 77, **81**, 83  
 geochemical composition 151, 153, **153**, 154, 155, 155, 158, 160, 184  
 grain size 105, 109, 132  
 organic carbon 105, 110, **110**, 111  
 oxygen 203  
 permeability 102  
 sedimentation rate 13, 73, 168, 167  
 seismic evidence 35, **35**, 36, 37, 38, 39, 41, 42, 43, 44, 45, 46, 63, 63, 65, 68  
 turbidites, compared 62  
*see also* geotechnical properties
- permeability  
 determination of, Nares Abyssal Plain 133, **140**, 141, 141  
 hydrothermal circulation, effect on 114, 116  
 pore pressure, effect on 98–9  
*see also* reverse faulting
- pH, carbon oxidation, effect of 167
- phosphate, monohydrogen, evidence of sedimentation rate 14, 17
- phosphate nodules, Madeira Abyssal Plain 160, 161
- phosphorus, Madeira Abyssal Plain  
 analysis of 181, **183**  
 behaviour of 201, 202, 203, 205, 206  
 profile 186, 188, 190, 191, 193, 196, 197, 197  
 values **185**, **209**, **210**, **211**, **212**, **213**  
*see also* dissolved organic phosphorus
- Piper's E divisions, turbidites, Madeira Abyssal Plain 73, 82
- Planolites*, burrows, Madeira Abyssal Plain 175, 175, 176, 181
- plutonium isotopes, sediment mixing estimation 221, 223, 226
- ponded turbidites ix  
 Madeira Abyssal Plain 88  
 overpressure generation 98, 102  
 seismic evidence 35–6, **35**, 45, 54, 56, 57, 59, 62, 65, 66
- pop-up pore-pressure instrument 117–9, 118, 119
- pore-pressure  
 acoustic blanking 98  
 gradients, Great Meteor East  
 calculation of 117  
 measurement of 116, 117–9, 118, 120, 127  
 pore-water advection, determination of vii, 123–4, 123, **124**, 125, 125, 126  
 tidal cycles 117, 119–20, 120  
*see also* reverse-faulting
- pore-water  
 sedimentation rate, evidence of 14, 17, 17, 18, 20, 21  
*see also* organic carbon mass balance, oxidation front
- pore-water advection  
 Great Meteor East  
 determination of 113–4  
 mechanisms for 114, 116, 117  
 results vii, 123–7, 123, **124**, 125, 126, **126**  
 use of term 113  
 values 113  
*see also* pore-pressure, reverse faulting, temperature profiles
- porosity  
 Nares Abyssal Plain 133, 134, 135, 136–7, 136, 138, 141, 141  
 sediment accumulation rate, importance of 15  
 seismic profiles, effect on 56
- Porto Santo, turbidite, source of 77
- post-oxic sediments  
 use of term 167  
*see also* oxidation front
- potassium  
 analysis of 149, **151**, 181, **183**  
 Madeira Abyssal Plain, profile 184, 186, 188, 191, 193, 197, 198  
 values **185**, **209**, **210**, **211**, **212**, **213**  
 Nares Abyssal Plain 14, 15, 17, 18, 20  
 provenance **152**, **153**, 155, 156, **156**, 158, 159, **163**, **164**, **165**
- primary productivity, carbon mass balance, importance in 215
- provenance, sediment ix–x, 3–4, 4, 8, 10  
 Madeira Abyssal Plain 72, 72, 179, 180  
 geochemical evidence vii, 76–7, 76, 79–80, 85, 110, 114, 149–61, 150, 154, 155, 157, 158, 184  
 methods 148–9, **148**, **151**  
 values **152**, **153**, **156**, **163**, **164**, **165**  
 Nares Abyssal Plain 132  
 NW Atlantic continental margin 217
- Puerto Rico Trench 1, 1, 2  
 sediments, source of 4  
 turbidites, shape of 6
- pumice, Madeira Abyssal Plain 159
- PUPPI, pop-up pore-pressure instrument 117–9, 118, 119
- pyroxenes, Madeira Abyssal Plain 159
- quartz, Madeira Abyssal Plain 73, 179, 191
- radioactive waste disposal, use of deep sea sediments vii, viii, 33, 49, 52, 71, 87, 113
- radioactive decay, thermal gradient, effect on 123
- radiolarians, Madeira Abyssal Plain 75, 158, 160
- Redfield ratio, NW Atlantic Continental Margin 219, 219, 228
- redox processes *see* oxidation front
- respiration on sea-floor, NW Atlantic Continental Margin 223, **223**, **225**, 226–8, 227
- reverse faulting  
 Great Meteor East 90, 92–4, 93, 96, 96  
 modelling of dewatering due to differential compaction vii, 98, 99–100, 100, 103–4, 116  
 impermeable-fault model 102–3  
 permeable fault model 100–2
- Reykjanes Ridge, thermal gradient 122
- Rhone River fan system, abyssal basins, effect on 10

- Rio Grande Rise, benthic flow pattern 26, 26  
 rippling, Great Meteor East 56  
 roll-over, faulting, Great Meteor East 91, 92, 93, 94, 98  
 Roncal bed, Pyrenees, turbidite 8–9
- Saharan sediment slide 71, 83–4, 159–60  
 seismic evidence 33, 34, 38, 41, 44, 53, 56, 59  
 Saharan dust plume 75  
 Saharan continental rise *see* African (NW) continental slope  
 sand 8, 9–10, 56  
 Sandwich Island, benthic flow pattern 26, 26  
 sanidine, Madeira Abyssal Plain 159  
 St Croix Basin 1, 1, 2  
 scandium, Madeira Abyssal Plain  
 analysis of 181, **183**  
 profile 187, 189, 194, 198, 198  
 values **185, 209, 210, 211, 212, 213**
- sea level, turbidite emplacement, effect on viii, 10  
 Great Meteor East 65, 71–2, 84, 84, 85  
 seabed morphology  
 Argentine Abyssal Plain 24, 26, 26, 27–8, 28, 29  
 Great Meteor East 54–6, 55, 56, 57, 58, 59, 59, 68  
 Seabed Working Group of the Nuclear Energy Agency vii, viii, 49  
 seamounts, Canary Basin 50, 51, 52  
 seismic data 34, 35, 36, 36, 41, 45  
 turbidite source 72, 72, 79–80  
 sediment mixing rate 215  
 NW Atlantic continental margin 222, 223  
*see also* bioturbation
- sediment slides  
 Cape Verde Basin 39, 40, 41  
 turbidites, compared viii, 33  
*see also* African (NW) continental slope
- sediment thickness viii  
 determination of 111  
 entry points, indication of 4  
 Madeira Abyssal Plain 59, 60, 62, 88, 89, 90, 91, 91, 103, 105, 114, 179  
 faulting relationship to 91, 92, 96, 99–100, 103  
 thermal gradient, effect on 124–5, 125  
 NW Atlantic continental margin 217
- sediment transport pathways, Madeira Abyssal Plain 158, 159, 179, 180  
*see also* provenance
- sediment winnowing, Great Meteor East 55  
 sedimentary organic carbon, NW Atlantic continental margin 219–20, 220, **232, 233, 234, 235, 236**  
 sedimentation rate 5, 10  
 Greater Antilles Outer Ridge 13, 20  
 index, calculation of 14  
 Madeira Abyssal Plain 52, 62, 63, 63, 65, 72, 73, 168  
 faulting, effect on 98–9, 103  
 organic carbon, effect on 158, 167  
 temperature gradient, effect on 123  
 Nares Abyssal Plain vii, 17, 19, 20–1  
 geochemical data 15, 17–19, 18  
 geotechnical characteristics, effect on 141  
 sedimentological data 14–15, 16, 17  
 seismic data 14, 15, 19–20, 19
- NW Atlantic continental margin 217  
 organic carbon, effect on 215, 222, 223
- sedimentology  
 early work viii–ix  
*see also* pelagic sediments, sedimentation rate, turbidites, turbidity currents
- seepage velocity, calculation of 117
- seismic evidence  
 sea-floor morphology, Argentine Basin 23, 24, 26, 26, 27–8, 28, 29, 30  
 sediment accumulation rates, Nares Abyssal Plain 14, 15, 19–20, 19, 20, 21  
*see also* acoustic blanking, Cape Verde Basin, faulting
- seismicity, Madeira Abyssal Plain 52
- sessile sediment foragers, Great Meteor East 106–7, 107, **107, 108, 109, 110, 110, 111**
- shear strength, sediments  
 calculations of 119  
 Great Meteor East 109, 110  
 Nares Abyssal Plain 133, 134, 134, 135, 135, 136, 136, 137, 137, 138–9, 138, 139
- silicic acid, evidence of sedimentation rate 14, 15, 17, 18
- silicon, Madeira Abyssal Plain  
 analysis of 181  
 profile 168, 168, 186, 188, 191, 192, 196, 198  
 values **185, 209, 210, 211, 212, 213**  
 sediment provenance, evidence of 76, 76  
 volcanic ash 184
- silt  
 Nares Abyssal Plain 14–15, 16, 132  
*see also* geotechnical properties
- Silver Abyssal Plain ix, x, 1, 1, 2, 6, 10, 71
- slides *see* sediment slides
- slumps, importance of 33
- smectite, turbidites 1, 141, 179
- sodium, Madeira Abyssal Plain  
 analysis of 149, **151**  
 profile 186, 188, 193, 197, 198  
 values **185, 209, 210, 211, 212, 213**  
 provenance **152, 153, 156, 163, 164, 165**  
 volcanic ash band 184
- 'soft' turbidite, Grenada Basin 8, 9
- Sohm Abyssal Plain viii, ix, x, 1, 1, 2  
 pore-water advection rate 113  
 sediments ix–x, 7, 10, 10–11, 217  
 thermal gradient 122
- Sohm Gap, source of sediments 3–4
- solid-phase  
 model, organic carbon 215, 220–3, **221, 222, 223, 223**  
 pore-water model, compared 225–6, **226, 229**  
 oxidation fronts, evidence from  
 active example 170–3, 172, 173, 174, 176  
 fossil example 173–6, 175
- sounding lines, use of viii
- source areas *see* provenance
- South Balearic Basin 1, 1, 6, 6
- spoke burrows *see* sessile sediment foragers
- sponge spicules, Great Meteor East 75
- STACOR, coring equipment 148
- strontium, Madeira Abyssal Plain  
 analysis of 181, **183**



- profile 184, 187, 189, 195, 199, 200  
 values **185, 209, 210, 211, 212, 213**
- submarine canyons, source of sediment 3–4  
 submarine springs, hydrothermal circulation 114
- sulphate  
   Madeira Abyssal Plain 98, 123, 180, 200  
   Nares, Abyssal Plain 14, 17, 20  
   NW Atlantic continental margin 225, **225**
- sulphide sediments  
   use of term 203  
   *see also* oxidation front
- sulphur, Madeira Abyssal Plain **152**, 153, **153**, 155, 155, **156**, 158, 160, **163, 164, 165**  
   analysis 149
- surface-wave activity, pore-pressure, effect on 117
- synthetic faults, Great Meteor East 94
- tectonic framework, importance of 10
- temperature profiles  
   gas production, cause of 98  
   hydrothermal activity, anomalies 114  
   pore-water advection, Great Meteor East vii, 113–4, 116, 124–5, **124**, 125, 125–6, 126, **126**  
   calculation of 120–1  
   measurement of 121–3, 122, 126–7
- Tenerife, turbidites  
   provenance 76, 184  
   source of, Madeira Abyssal Plain 184
- terrigenous clay, Great Meteor East 63
- thermohaline-contour-current, Argentine Basin 27–8
- three-layer model, organic carbon distribution 220–1, 220, **221**, 222, 222, 229
- tidal activity, pore-pressure, effect on 117, 119–20, 120
- titanite, Madeira Abyssal Plain 159, 160
- titanium, Madeira Abyssal Plain  
   analysis of 149, **151**, 181, **183**  
   profile 184, 186, 188, 191, 192, 196, 198  
   values **185, 209, 210, 211, 212, 213**  
   provenance, evidence of **152**, 153, **153**, 154, 155–6, 155, 158, **156**, 159, 160, 161, **163, 164, 165**  
   volcanic ash 184
- Tongue of the Ocean 1, 1, 2
- topography, thermal gradient, effect on 123
- total inorganic nitrogen, NW Atlantic continental margin 228, 228
- trace elements *see* oxidation front, provenance
- trachyandesitic magma, turbidite source 76, 76, 159
- true velocity, seepage velocity 117
- Tufts Abyssal Plain ix, ix, x
- turbidites  
   analysis of 1–2  
   basin filling, importance in 2–3  
   bathymetry, importance of 5, 5, 8, 9  
   debris flows, compared viii, 2, 3, 3  
   giant events 8–9, 9  
   Madeira Abyssal Plain  
     calcium carbonate 73, 105, 110, 114  
     colour 72, 73, 167–8, 174–5, 174  
     correlation of 71, 73, 74, 75, 77, **81**, 147, 148, 149–50, 149, 167  
     distribution of vii, 72, 73, 77–84, 74, 78, 79, 80, 82, 84, 85, 114  
     faulting, relationship to thickness 91, 92, 96, 99–100, 103  
     mineralogy 73–7, 76, 114, 147, 159, 161, 179  
     seismic evidence 56, 62, 63, 63, 65, 66, 68  
     volume of viii, **81**, 84, 84, 85  
   Nares Abyssal Plain 13, 132  
   sand, use of 8, 9–10  
   shape of 5–6, 5, 6  
   *see also* animal traces, bioturbation, entry points, geotechnical properties, grain size, oxidation front, provenance, sediment thickness, sedimentation rate, turbidity currents
- turbidity currents  
   canyon systems 27  
   channelization of 6–7  
   channels, seismic evidence 34, **35**, 36, 44  
   early study of viii  
   erosion by 7–8, 7  
   initiation of viii–ix, 10, 65, 71, 83–4, 88, 114  
   pathways, seismic evidence 33, 34, 35–6, **35**, 36, 37, 37, 38, 39, 41, 42, 44, 46  
   *see also* entry points, provenance, turbidites
- two-layer model, organic carbon distribution 220–1, 220, **221**, 222, 222, 229
- unconformity, Great Meteor East 65, 68
- uranium, Madeira Abyssal Plain  
   analysis of 181  
   profile 170–1, 172, 174–5, 176, 184, 187, 189, 190, 191, 195, 196–7, 199  
   behaviour of 201, 204, 205, 206  
   values **209, 210, 211, 212, 213**
- vanadium, Madeira Abyssal Plain  
   analysis of 181, **183**  
   profile 171, 172, 174–5, 176, 184, 187, 189, 190, 191, 195, 196–7, 199, 201, 204–5, 205, 206  
   values **209, 210, 211, 212, 213**
- vane shear strength *see* shear strength
- velocity, turbidity current 83
- Vema Channel, Argentine Basin, benthic flow 23, 26
- Vema Gap, N Atlantic x, 13, 13, 131, 132
- volcanic ash, Madeira Abyssal Plain 184, 190
- volcanic glass, Madeira Abyssal Plain 75–7, 76, 159, 161
- volcanic turbidites, provenance 74, 75–7, 76, 153, 154, 154, 155–6, 155, 157, 158, 159–60, 160, 161
- volcanoclastic deposits  
   Grenada Basin Plain 3, 4, 8  
   Madeira Abyssal Plain 63, 83, 191
- volcanism, Madeira Abyssal Plain 52, 99
- WASP, wide-area survey photography system 105
- water content, sediments, Nares Abyssal Plain 133, 133–4, 134, 135, 135, 136, 136, 137–8, 137, 138, 139
- Weddell Abyssal Plain ix, x, xi
- Western Boundary Undercurrent 13, 21
- wide-area survey photography, use of 105
- Wilming Canyon, sediment source 3–4
- 'Wusten Quartz', Great Meteor East 75

- yttrium, Madeira Abyssal Plain  
analysis of 181, **183**  
profile 187, 189, 195, 198, 199  
values **185, 209, 210, 211, 212, 213**
- Zapiola Ridge, Argentine Basin 24, 26–7, 26, 27, 28,  
29, 30
- zinc, Madeira Abyssal Plain  
analysis of 181, **183**  
profile 168, 168, 184, 187, 189, 190, 191, 195, 196–  
7, 198, 199, 201, 205, 206  
values **209, 210, 211, 212, 213**
- zirconium, Madeira Abyssal Plain  
analysis of 149, **151**, 181, **183**  
profile 187, 189, 195, 198, 199  
values **185, 209, 210, 211, 212, 213**  
provenance 151, **152, 153, 154**, 156–7, **156, 158**,  
159, 160, 161, **163, 164, 165**
- zircon, Madeira Abyssal Plain 159
- Zoophycos*, burrows, Madeira Abyssal Plain 181