

# Index

Page numbers in *italic* denote figures. Page numbers in **bold** denote tables.

- Acasta Gneiss 6, 265, 272  
accretion, island arcs 3, 4, 5  
Adakite, Kadiri greenstone belt 149, 154  
Adma Diorite 71, 72  
Alpine-style orogeny, EPT and BGGT 91–92  
Amazonian Craton 307, 308  
ambient-noise tomography 48, 49, 50  
Ameralik dykes 117, 122  
amphibolite, Isua supracrustal belt 116, 119, 123, 127  
Andean convergent margin, Peru 307  
    continental growth and subduction onset 316–318  
    geodynamics and magmatic source 315–316  
    geology 308–311  
    Hf isotopes 306–318  
    juvenile magmatism 314, 317–318  
    subduction 305, 307, 308–310  
andesite  
    Kadiri greenstone belt 147–149, 153, 155  
    magma 1–2  
Antarctica 73, 75  
apparent polar wander paths (APWPs) 23, 24, 69  
    Franklin–Adelaide track 71, 72  
    palaeomagnetic evidence 71–75  
arc accretion 3, 4, 5  
arc magmatism 3–4, 305–306  
    Andean convergent margin 308–311  
    continental recycling 306  
arc–plume action, Neoproterozoic crust 135–158  
Archaean  
    continental crust 6, 7, 8, 217, 227  
    granite–greenstone 8  
    Ukrainian Shield 232–257  
    dome-and-keel architecture 94–99  
    ocean temperature 26  
    plate tectonic onset 205–208, 217  
Ardvreck Group 262, 264, 265  
Arequipa Massif 307, 308, 317  
argon, outgassing 18  
Arrowsmith Orogeny 45  
Atar Group Complex 71, 72  
atmosphere, oxygen 24–25  
Australia 71, 73, 75  
Azov Domain  
    age patterns 252–254  
    Archaean crust formation 254–255, 256  
    geology 228, 229–231  
Badcallian metamorphic event 262  
Baffin Strait, seismic wavespeed 57  
banded iron formations 25  
    Isua supracrustal belt 114, 115, 116, 117, 123  
Barberton Granitoid-Greenstone Terrane  
    Alpine-style orogeny 91–92  
    crustal evolution 84, 85  
    as volcanic plateau 99–103  
    dome-and-keel architecture 94–99, 100  
    fractionating magma chambers 89  
    geological history 84–85, 86  
    greenstone successions 87–89, 93  
    infracrustal TTG 89, 91  
    metamorphic core complexes (MCC) 98–99  
    mineral systems 91  
    PCO 98, 100  
    subduction–accretion model 87, 99  
    subduction–collision metamorphism 92–94  
Barents Sea Group 72, 73  
Basal Morar Group 262, 263, 264–265  
    zircon geochronology 267, 268, 269, 271, 272–274  
Basal Quartzite Member 263, 264, 265  
    zircon geochronology 267, 268, 269, 271, 272, 273  
basalt  
    Kadiri greenstone belt 145–147, 148  
    plume v. subduction-related source 152–153  
    magma 1–2  
    *see also* mid-ocean ridge basalt (MORB);  
    ocean island basalt (OIB)  
‘basalt barrier’ 35, 37  
basalt–eclogite transition 18  
    geodynamic model 33, 35  
basin development, Hudson Bay 62  
basin sedimentation, Andean margin 310, 311  
Bonar Creek orthogneiss 324, **336–337**, 340, 341  
boninites  
    Isua supracrustal belt 116, 119, 123, **124**, 127  
    Kadiri greenstone belt 138  
Bug Series 229  
Buller Terrane 324, 325  
Canadian Shield 42  
    lithosphere–asthenosphere boundary 43, 45, 52  
    lithospheric thickness 46  
    mantle keel 45, 47–53, 60, 61  
    mantle transition zone 46, 47  
    plate tectonics 60–61  
    seismological studies 45–63  
Cape Smith belt 45  
carbon, redox cycling 77, 78  
carbon dioxide 24, 78  
Chesterfield Block 42, 43–44, 45  
Chocolate Formation 310, 311  
chondritic uniform reservoir (CHUR)  
    199, 325, 327, 347  
Churchill Plate 42, 44, 45, 57, 61  
Clachtoll Formation 263, 264  
    zircon geochronology 267, 268, 269, 271, 273, 274  
Clapeyron slopes 29, 30, 53  
Clarke River orthogneiss 324, **335**, 341

- Clarke River paragneiss 324, **332**, 338  
 climate history 24, 25  
 Columbia supercontinent 69, 165, 207, 211, 216  
 Congo craton 165–192  
 continental arcs 3, 5, 6  
 continental crust  
   Archaean 6, 7, 8, 205–208, 217, 227  
   composition 1–3  
   destruction 210–211, 215, 216  
   generation v. destruction 3, 5, 8, 211, 215–217,  
     305–306, 317–318  
   growth rate  
     Fennoscandian Shield 281, 295–298  
     near-steady-state Armstrong model 211, 215  
     through time 8, 19, 211–214, 217  
   Hadean, formation 5–6, 7, 202–205, 215, 217  
   *in situ* development 87–99  
     Alpine-style orogeny 91–92  
     dome-and-keel architecture 94–99, 100  
     fractionating magma chambers 89  
     greenstone successions 87–89  
     infracrustal TTG 89, 91  
     mineral systems 91  
     subduction–collision metamorphism 92–94  
   lid 18, 70, 74, 75–78  
   Neoarchaean arc–plume action 135–158  
   Neoproterozoic quasi-integrity 71–75  
     Ediacaran break-up 75–79  
   oxygen isotopes 18, 20  
   preservation bias 214–215, 217  
   preserved record 22–23, 26  
   production  
     episodicity 18–20, 213  
     juvenile 208, 213–214, 217, 297, 298  
     Andean margin 306, 314, 317–318  
     recycling *see* recycling, crust  
     reworking *see* recycling, crust  
 continental margins, convergent 305–306  
 core, convection 23–24  
 core–mantle boundary, heat flux 23–24, 27, 29, 35  
 cratons, mantle keels 41–42  
 Crooked River paragneiss 324, **333**, 338, 346  
 Cu–Mo porphyry deposits, East Pilbara 87, 91  
 Cumberland Batholith 44, 45  
 cumulates, garnet-bearing 4, 5  
  
 dacite–rhyolite 141–145, 148, 149, **150**, 152,  
   154, 155, 156  
 Damara Belt 165, 166  
 Danopolonian Orogeny 283, 292  
 deformation, Sveconorwegian Province 283–284  
 delamination 3, 4, 5  
 Dharwar craton  
   geology 136–138, 137  
   Neoarchaean geodynamic evolution 155–158  
   *see also* eastern Dharwar craton; western  
     Dharwar craton  
 diapirism 95  
 Dniestr–Bug Series 229  
   earliest crust 254  
   enderbite ages 242–245, 247, 252, 257  
  
 dome-and-keel architecture 86, 91, 92, 94–99, 100  
 dunite, Isua supracrustal belt 116, 118  
 dykes  
   Huab Metamorphic Complex 168  
   Isua supracrustal belt 117, 119, 122  
  
 Earth  
   climate and atmosphere 24–26  
   crustal generation v. crustal destruction 215–217  
   early evolution 83  
   evolution of life 25, 26  
 earthquakes, Hudson Bay 50  
 East European Craton 228  
 East Pilbara Terrane  
   Alpine-style orogeny 91–92  
   crustal evolution 84, 85  
     as volcanic plateau 99–103  
   dome-and-keel architecture 86, 91, 92, 94–99, 100  
   fractionating magma chambers 89  
   geological history 84, 85, 86, 94  
   greenstone successions 87, 88, 94  
   infracrustal TTG 89, 91  
   metamorphic core complexes (MCC) 98–99  
   metamorphism 89, 90, 94  
   mineral systems 91  
   PCO 98, 100  
   subduction–accretion model 87  
 Eastern Cordillera 307, 308  
   metamorphism 310  
 eastern Dharwar craton 136–138, 137  
   Kadiri greenstone belt  
     dacite–rhyolite 141–145, 149, **150**, 152, 155, 156  
     geology 138–140  
     Neoarchaean crust formation 155–158  
     volcanic rocks 138–158  
       alteration 145, 146  
     andesite suite petrogenesis 147–149  
     basalt suite petrogenesis 145–147, 148  
     dacite–rhyolite petrogenesis 149, **150**, **151**, 152  
     major and trace elements 141–144, 146–147  
     Nd isotopes 145  
     petrography 140–141  
     plume v. subduction-related source 152–153  
     tectonic evolution model 153, 155  
     U–Pb zircon dating 144–145  
 Eastern Segment, Sveconorwegian Province  
   geology 282, 283  
   lower tectonic level 284  
     zircon geochronology 285–289, 291, 293  
   middle tectonic level 283–284  
     zircon geochronology 285, **286**, 288, 289  
   upper tectonic level 283  
     zircon geochronology 285, **286–287**, 288  
 eclogite 21, 33  
   *see also* basalt–eclogite transition  
 Ediacaran break-up 74, 75–79  
 Elatina periglacial rocks 71, 72, 75  
 Enard Bay 263, 264  
 enderbites, Ukrainian Shield 229  
   zircon geochronology 232–233  
   ages 242–245, 247, 252

- Eoarchaean  
 geological record 114–115  
 Isua proto-arc 113, 127–129  
 North Atlantic Craton 274–275  
 plate tectonics 205
- episodicity, Precambrian 17–37  
 crustal production 18–20, 213  
 geodynamic models 26–35  
 mantle convection 8, 18, 29–30  
 mantle depletion 19, 20  
 mantle plumes 30–33  
 subduction 26–29, 35  
 volcanism 24, 30, 33
- epithermal vein deposits 91
- Epupa complex 165, 166, 169–170
- Eriboll Formation 265
- extinction, Ediacaran 78
- faint young Sun paradox 24
- Fedorivka syncline 231  
 metasediment sample 232, 233  
 zircon 236, 246, **248–249**, 252–254, 257
- Fennoscandian Shield  
 crustal growth 281  
 geology 282  
 U–Pb and Hf zircon geochronology 285–298
- Fig Tree Group 97, 102  
 mineral system 91–92
- fluid-fluxing 121, 122, 123, 127
- foliation, Kadiri greenstone belt 140–141
- Franken granodiorite 177, 178  
 major and trace element analysis **171**  
 U–Pb zircon geochronology **174–175**, 183–185
- Franklin LIP 72, 73
- Franklin–Adelaide APW track 71, 72
- Fransfontein Granite Suite 166, 167, 177, 178  
 geochemistry 179–181  
 geodynamic evolution 190–192  
 geology 169  
 major and trace element analysis **171**, 190  
 Rb–Sr isotopes 187–188, **189**  
 Sm–Nd isotopes 187, **189**, 190, 191  
 U–Pb zircon geochronology **173–175**, 183–185
- Fraser Complex gneiss 324, 325
- fringing arcs 4, 5
- Fucoid Beds 265
- garnet 4, 5, 127
- geochemistry  
 continental breakup 76–78  
 Isua belt 116, 118, 120–122, 123, **124–125**, 126  
 Kamanjab Inlier 179–183
- geodynamic models 26–35, **36**
- geodynamics  
 Andean convergent margin 305, 309, 310, 315–316  
 global 21–23  
 geodynamo 23–24, 35  
 geoid anomaly, Canadian Shield 42
- Gerstenkorn Event 70
- glaciation, Precambrian 24, 25  
 and Ediacaran break-up 77, 78
- Glenelg–Attadale Inlier 263, 265, 273
- gneiss  
 Acasta Gneiss 6, 265  
 enderbitic 229  
 Eoarchaean rock 114–115  
 Epupa complex 169–170  
 Huab Metamorphic Complex 168, 178  
 geochemistry 181–183  
 major and trace element analysis **172**  
 U–Pb zircon geochronology **175–176**, 185–186  
 Lewisian Gneiss Complex 262, 263  
 Sveconorwegian Province 283–284, 285,  
 289, 291, 293–295  
 Western Province 324, 325–350  
 zircon 323  
*see also* orthogneiss; paragneiss
- gold  
 lode deposits 91  
 orogenic 21, 22
- Golovanivsk suture zone 228, 229
- Gondwana  
 formation 20, 22, 211, 216  
 margin 208, 326
- Gothian Orogeny 284, 291–292, 297
- granite  
 anorogenic 21  
 dome-and-keel architecture 94–99  
 PCO 94–99  
 Sveconorwegian Province 283–285, 291–293  
*see also* Rubha Ruadh granite
- Granite Hill Complex gneiss 324, 325
- granite–greenstone  
 Archaean 8, 135  
*see also* Barberton Granitoid-Greenstone  
 Terrane; Kadiri greenstone belt;  
 Middle Dniepr Domain
- granitoids  
 Epupa complex 169–170  
 Fransfontein Granite Suite 169  
 Kadiri greenstone belt 138–140  
 Ukrainian Shield 229–231
- Great Oxygenation Event 207
- greenhouse gases 24
- Greenland Group 324, 325, 342,  
 346, 347, 349
- greenstone  
 Azov Domain 230  
 BGGT 87–89, 98, 102  
 dome-and-keel architecture 94–99  
 EPT 87, 89, 90, 98  
 Kadiri greenstone belt 138–158  
 Kolar-type 137–138  
 Neoarchaean 6, 8, 135–136  
 PCO 94–99, 103
- Grenville orogenic belts 70, 73  
 isotope trends 208–209, 210
- Grootfontein gabbro 170
- Grootfontein granite 170
- Grootfontein Inlier 165, 170
- Grootfontein mafic body 170
- Grootfontein Metamorphic Complex 170

- Hadean  
 crust formation 5–6, 7  
 HACCAP plate tectonic model 204, 205  
 LOLIHP proto-crust model 204, 205, 215  
 zircon data 202–205, 217  
 plate tectonic onset 205–208
- Hales discontinuity 48
- Hall Peninsula Block 42, 44–45
- Hallandian Province 282
- Harohalli dykes 71, 72
- $^4\text{He}/^3\text{He}$  ratio 19, 20, 26, 35
- Hearne craton 42, 43, 44  
 crustal formation 60  
 crustal structure 48
- Hf isotopes 17, 18, 20, 197, 198–199,  
 204, 205, 208, 210, 211  
 Andean convergent margin 306–308, 311–318  
 Fennoscandian Shield 285–298  
 Lewisian Gneiss Complex 266–275  
 mantle 17, 18, 20, 128–129, 199  
 Tasmanides convergent margin 306  
 Ukrainian Shield 232, 242  
 Odesa enderbite sample **240–241**, 255–256  
 Soroki greenstone belt **250–251**, 252  
 Western Province gneiss 327, **332–337**, 339,  
 340–345, 347, 349–350  
*see also* Lu–Hf isotopes
- Hf–O isotopes, zircon 202, 213  
 Ukrainian Shield 235
- HFSE (high field strength element)  
 Fransfontein Granite Suite 169, 179  
 Isua supracrustal belt 121  
 Koabendus Group 168
- Hinneryd granitic augen gneiss **286**, 288, 289  
 age 293, 295
- Hoanib area 166, 169, 170
- Hoarusb area 166, 169
- Hohonu Batholith 324, 346
- Hokitika Gorge orthogneiss 324, **335–336**,  
 340, 341, 342, 343, 346
- Huab Metamorphic Complex 166, 167, 178  
 geochemistry 181–183  
 geodynamic evolution 190–192  
 geology 167–168  
 major and trace element analysis **172**, 190  
 Rb–Sr isotopes 187–188, **189**  
 Sm–Nd isotopes 187, **189**, 190, 191  
 U–Pb zircon geochronology **175–176**,  
 185–187
- Hudson Bay 42–45  
 mantle keel 45, 47–53, 57, 61  
 neotectonics and basin development 61–62  
 seismological studies 45–46
- Hudson Bay Lithospheric Experiment  
 (HuBLE) 42, 46–63, 47  
 P-wave velocity model 57, 58, 59  
 results 47–53  
 crustal structure 48–50  
 mantle seismic anisotropy 50–51  
 mantle transition zone 52–53  
 seismicity 50, 62  
 surface wave tomography 51–52  
 upper mantle tomographic model 53–57  
 ‘Hudson protocontinent’ 44  
 Hudsonian Orogeny 45
- Idefjorden Terrane 282, 283, 284  
 U–Pb and Hf zircon geochronology **287**,  
 291–292
- Ilo batholith 307, 310, 311, 316
- Inverian metamorphic event 262
- iron, reactive/total ratio 77, 78
- Island Arc Basalt 2, 3, **124–125**, 127
- island arcs 3–4  
 accretion 3, 4, 5  
 comparison with Eoarchaeon proto-arc 126–128
- Isua supracrustal belt, Eoarchaeon 6, 115–116, **121**  
 apparent sea-level 123, 126  
 convergent plate boundary setting 126–127  
 geochemistry 116, 118, 120–123, **124–125**, 126  
 juvenile crust 123  
 lithology 116–118  
 pillow structures 116, 118, 119, 123, 126  
 proto-arc 113, 127–128  
 comparison with island arcs 126–128  
 mantle isotopic signatures 128–129  
 submarine/subaerial environments 118, 119  
 tectonism 122–123  
 zircon geochronology 116, 117, 119, 121, 123
- Itabuma dykes 71, 72
- Itsaq Gneiss Complex 113, 115, 265
- Izu–Bonin arc 3, 4
- Jack Hills region, zircon data 198, 202–205
- Jurua Orogeny 310
- Kaapvaal Craton 6  
 crustal growth as volcanic plateau 99–103  
*see also* Barberton Granitoid–Greenstone Terrane
- Kadiri greenstone belt  
 dacite–rhyolite 141–145, 148, 149, **150**,  
 152, 154, 155, 156  
 folding 138–139  
 geology 137, 138–140  
 Neoarchaeon crust formation 155–158  
 pillow structures 138, 139  
 volcanic rocks 138–158  
 alteration 145, 146  
 andesite suite petrogenesis 147–149  
 basalt suite petrogenesis 145–147, 148  
 dacite–rhyolite petrogenesis 148, 149–152  
 foliation 140–141  
 major and trace elements 141–144,  
 146–147, **151**  
 Nd isotopes 145  
 petrography 140–141  
 plume v. subduction-related source 152–153  
 tectonic evolution model 153, 155  
 U–Pb zircon dating 144–145, **150**
- Kamanjab Inlier 165–192, 167  
 geochemistry 179–183  
 geodynamic evolution 190–192

- Kamdescha granite 169, 178  
 major and trace element analysis **171**  
 U–Pb zircon geochronology **173–174**, 183
- Kaoko Belt 165, 166
- Karamea Suite granitoids 324, 346, 347  
 generation 347, 349
- Karelian Province 265, 266, 272
- Kaross granite 169, 178  
 major and trace element analysis **171**  
 U–Pb zircon geochronology **173**
- kernel density estimation, 2D 210, 211, 212
- Khashuvato–Zavallya Suite 229
- Khoabendus Group 166, 167, 168–169
- kimberlite, diamondiferous, Hudson Bay area 45
- Kirovograd (Ingul) Domain 228, 229
- Kishorn Nappe 264
- Kishorn Thrust 263
- Kohistan island arc 3
- Komati Schist Zone 88, 91, 98, 102
- komatiite eruption 6, 7, 8, 19  
 EPT and BGGT 84, 86, 87, 103  
 mantle temperature 20–21, 31, 33  
 as source of water 103
- Kosharo–Oleksandrivka Suite 229
- Kozachy Yahr enderbite sample 232, 233  
 zircon 234, **238–239**, 243–244, 245, 247, **253**
- Krivyy Rih suture zone 228, 229
- Krutobalka Suite 230–231
- La/Yb ratio  
 Isua supracrustal belt 121, 123, 127  
 tonalite-trondhjemite-granodiorite (TTG) 21
- Labrador, North Atlantic Craton 274
- large igneous provinces (LIPs) 5, 19, 22
- Laurentia 42, 73, 75
- Laurentian keel 46, 47–53, 57, 61
- Laxford Shear Zone 262
- Laxfordian Orogeny 262, 275
- Lewisian Gneiss Complex 261, 263  
 U–Pb and Hf geochronology 266–275
- Li isotopes, zircon 204–205
- life, evolution of 25, 26
- LILE (large ion lithophile element) 2, 3  
 HFSE (high field strength element) ratio  
 Fransfontein Granite Suite 169, 179  
 Koabendus Group 168  
 Kadiri greenstone belt 141, 148–149, 152, 155
- lithosphere–asthenosphere boundary, Canadian Shield 43, 45, 52
- Little Dal Lavas 72, 73
- Long Lived Hadean Procrust (LOLIHP) 204, 205
- Lu–Hf isotopes  
 mantle/crust differentiation 199  
 zircon 199, 202–204, 271  
 Andean convergent margin 311  
 Fennoscandian Shield 285–298  
 Ukrainian Shield **241, 243, 250–251**, 255–256
- MacQuoid orogeny 45
- mafic crust 4, 6, 7
- magma chambers, fractionating, EPT and BGGT 89  
 magma generation 3  
 Neoproterozoic 135–136  
 magmatism, felsic 4  
 magnetic field strength 23–24, 35
- Mahe Granite 71, 72
- Malani Igneous Suite 71, 72
- mantle  
 670km boundary 35, 37  
 seismic heterogeneity 57, 60  
 subcontinental lithospheric (SCLM) 87, 99
- mantle convection, episodic 8, 18, 29–30
- mantle depletion 19, 20  
 model age 199–201  
 Nb/Th ratio 19, 20, 26, 35
- mantle keels 41–42  
 Hudson Bay 45, 47–53, 57, 61
- mantle melting 2, 102
- mantle plumes  
 Archaean 7, 8, 30–33, 36  
 Hadean 6, 7  
 Kadiri basalts 152–153  
*see also* superplumes
- mantle processes, spinel-perovskite phase change 17
- mantle recycling 208, 306
- mantle temperature, Archaean 20–21, 35
- mantle transition zone 52–53
- mantle-avalanche events 17, 18, 29–30, 31
- Marinoan Glaciation 75, 77, 78
- Mbozi Complex 71, 72
- Mesoarchaean, plate tectonics 205, 207
- Meta Incognita microcontinent 42, 44, 45, 60
- metabasalts, Isua supracrustal belt 116, 120, 123
- metamorphic core complexes (MCC) 98–99
- metamorphism  
 Andean margin 310  
 East Pilbara Terrane 86, 87, 89, 90  
 eclogite high pressure 21–22  
 grade through time 21–22  
 greenstones 89  
 Lewisian Gneiss Complex 262  
 subduction–collision, Barberton Granitoid–Greenstone Terrane 92–94  
 Sveconorwegian Province 283–285  
 UHT 21–22
- metasomatism, Isua supracrustal belt 118, 120–121
- methane 24
- mica schist, Isua supracrustal belt 116
- mid-ocean ridge basalt (MORB) 2, 3, 19  
 Isua supracrustal belt 127
- Middle Dniepr Domain 228, 229, 230
- Mikonui orthogneiss 324, **336**, 340–342, 343, 347
- Mikonui paragneiss 324, **332**, 338
- mineral systems 91
- mobile-lid convection 18
- model age, depleted mantle 199–201, 212, 213
- Moho 2, 48, 60
- Moine Supergroup 263, 264
- Moine Thrust 263, 264, 269, 274
- Moodies Group 86, 91, 97
- Moon, Gerstenkorn Event 70
- Morar Group *see* Basal Morar Group

- Mt Elliot orthogneiss 324, **335**, 340, 342, 343  
 Mt Elliot paragneiss 324, **334**  
 multi-channel cross-correlation technique 54–55  
 Mundine dykes 71, 72  
 Mylonite Zone 283, 296
- Nantuo glacial rocks 71, 72, 75  
 Nb/Th ratio  
   Kadiri greenstone belt 141, 144  
   mantle depletion 19, 20, 26, 35
- Nd isotopes  
   Ediacaran break-up 77, 78  
   Kadiri greenstone belt 145, **153**  
   mantle 128–129  
   Podolian and Azov domains **253**  
   *see also* Sm–Nd isotopes
- Neoarchaeal  
   crustal growth  
     arc–plume action 135, 152–158  
     Kadiri greenstone belt 155–158  
     plate tectonics 205, 207
- Neopangaea 71  
 Neoproterozoic, plate tectonic onset 205  
 Neoproterozoic–Phanerozoic boundary 70–71  
 North Atlantic Craton  
   Archaean crust 6, 274  
   geology 262, 265, 266
- Nosib Group 71, 72  
 Novopavlovka complex 229  
 Nuna supercontinent *see* Columbia supercontinent
- Ocean Island Basalt (OIB) 2, 3, 200–201  
   <sup>4</sup>He/<sup>3</sup>He ratio 19, 20  
 oceans, oxygen isotopes 26  
 Odesa enderbite sample 232, 233  
   zircon 234, **240–242**, 243, 244–245, 247, **253**, 255
- Olgino Suite 230, 231  
 Onverwacht Group 88, 92, 97, 99  
 Oortrek granite 178  
   major and trace element analysis **171**
- ophiolites 87, 88, 205  
 Orekhiv–Pavlograd suture zone 228, 229, 231  
 orogenic systems, isotope trends 208–209, 210  
 orogens, accretionary 5, 6  
 orthogneiss, Western Province 323, 324, 325  
   zircon 330–331, **335–337**, 340–342, 343  
   petrogenesis 346–347, 349–350
- Osipenkovo Series 230–231  
 osmium depletion 19, 20, 26, 35  
 Otjovasandu Formation 168  
 overprinting, Lewisian Gneiss Complex 261, 273  
 oxygen, atmospheric 24–25  
 oxygen isotopes  
   crustal 18, 20  
   Great Oxygenation Event 207  
   oceans 26  
   orthogneiss 330–331, **335–337**, 340–342, 343,  
     346–347, 349–350  
   paragneiss 327, 328–329, **332–334**, 339,  
     342, 345, 349–350  
   zircon 201–202, 204, 206–207, 271–272
- P-wave mantle velocity, HuBLE 48, 53–57, 58, 59  
 Palaeoarchaeal, plate tectonics 103  
 palaeointensity *see* magnetic field strength  
 palaeomagnetic record 23–24, 35  
 Palaeopangaea 70, 73, 75–78  
 Pan-African orogenies 208–209, 210  
 Pangaea  
   break-up 22, 310–311  
   slab dynamics 36, 37  
   *see also* Neopangaea; Palaeopangaea
- paragneiss, Western Province 323, 324, 325  
   zircon 327, 328–329, **332–334**, 338, 339, 342  
   petrogenesis 345–346, 347, 347–350
- partial convective overturn (PCO) 94–99, 100, 103  
 passive margin evolution 22  
 Phanerozoic-Proterozoic boundary 70–71  
 Pilbara Craton 6  
   *see also* East Pilbara Terrane
- pillow structures  
   Isua supracrustal belt 116, 118, 119, 123, 126  
   Kadiri greenstone belt 138, 139
- Pipe Rock Formation 265  
 plate tectonics 17–18, 21–23  
   Archaean continental crust 83–84, 136, 205–208  
   Canadian Shield 60–61  
   onset 5, 6, 8, 41, 42, 136  
   zircon data 205–208  
   Palaeoarchaeal 6, 8, 103  
   settings 3–4
- Podolian Domain 228, 229, 230  
   U–Pb zircon data 256–257
- porphyry systems 91  
 Portable Observatories for Lithospheric Analysis  
   and Research Investigating Seismicity  
   (POLARIS) 46
- Precambrian  
   episodicity *see* episodicity, Precambrian  
   plate tectonics, HuBLE 41, 46–63  
   preservation bias 214–215, 217  
   proto-Andean accretionary orogen 208, 209  
   proto-arcs, Eoarchaeal 7, 113, 127–129  
   comparison with Phanerozoic island arcs 126–128  
   and mantle isotopic signatures 128–129  
   proto-crust 6, 204, 205, 208, 215  
   protolith mixing, Western Province 347–349
- quartz porphyry, U–Pb zircon geochronology **176**
- Rae craton 42, 43, 44, 45, 48, 60  
 Rahu Suite 324, 325, 346–347, 349  
 rare-earth elements  
   EPT and BGGT 88, 89  
   Isua supracrustal belt 116, 118, 121  
   Kadiri greenstone belt 145, 148, 155  
   light 2, 3, 116  
   orthogneiss 330–331, **335–337**, 340, 346  
   paragneiss 327, 328–329, **332–334**, 338,  
     345–346
- Rb–Sr isotopes, Kamanjab Inlier 187–188, **189**  
 receiver function analysis, HuBLE 48  
 recycling

- crust 18, 20, 205, 206–207, 208, 213–218, 306  
 arc magmas 306, 315–316  
 crustal contamination 208, 306, 315–316  
 source contamination 208, 306, 315–316  
 Sveconorwegian Province 283, 295–296  
 mantle 208, 306
- rhyolite  
 Huab Metamorphic Complex 168, 178  
 geochemistry 181, 183  
 major and trace element analysis **172**  
 U–Pb zircon geochronology 187  
 Khoabendus Group 168–169  
*see also* dacite–rhyolite
- rift-drift estimates 75–78
- Rodinia 20, 21, 22, 70, 71, 208, 211, 216  
 hypothesis 69–70, 76, 78, 79
- Ros–Tikich Domain 228, 229
- Rubha Guail Formation 263, 264  
 zircon geochronology 268, 269, 271, 272,  
 273, 274
- Rubha Ruadh granite 262, 263  
 zircon geochronology 267, 268, 271,  
 272, 274, 275
- Saddleback–Inyoka Fault System 91–92, 98
- sagduction 6, 7, 136
- Sargur schist belts 136, 137
- Scourie ultramafic dykes 262
- seismic anisotropy, mantle 50–51
- seismic heterogeneity 57, 60
- seismicity, Northern Hudson Bay 50, 62
- Separation Point Suite 324, 325, 346–347, 349
- Sgurr Beag Thrust 263
- shear-wave splitting, HuBLE 50–51, 52, 60
- Shevchenko complex 231
- Siberia 73, 75
- skills, Huab Metamorphic Complex 168
- SKS splitting 50–51, 60
- slab dynamics 27, 29–30, 35–37
- Slave Province 265, 266, 272
- Sleat Group 262, 264
- Sm–Nd isotopes, zircon  
 Kadiri greenstone belt 145, **153**  
 Kamanjab Inlier 187, **189**, 190, 191  
 Lewisian Gneiss Complex 273  
 Ukrainian Shield 232, 233, 247
- Snowbird Tectonic Zone 44, 45, 50  
 seismic wavespeed 57
- Solitude Creek orthogneiss 324, **335**, 342, 343, 349
- Soroki greenstone belt 230, 231  
 metasediment samples 232, 233  
 zircon 237, 246, **250–251**, 252–257
- South Atlantic Ocean, opening 310–311
- South China Block 71, 73, 75
- stagnant-lid convection 18
- Stoer Group 262, 264
- ‘Stolzberg terrane’ 94, 99
- Sturtian Glaciation 75, 77, 78
- subcontinental lithospheric mantle (SCLM) 87  
 melt-depleted 99, 100, 102, 210
- subduction  
 Andean convergent margin 305–306, 307, 308–310  
 Archaean 18, 33, 35, 205  
 episodic 18  
 geodynamic model 26–29  
 subduction rollback 4  
 subduction zone  
 magmatism 2, 3  
 tectonic switching 305, 309, 310, 315–316  
 subduction–accretion models 84, 85, 87, 99  
 subsidence curves, rift-drift estimates 75–76  
 Sugluk Block 42, 44, 45, 60  
 sulphides, East Pilbara Terrane 87  
 sulphur isotopes  
 Ediacaran break-up 77, 78  
 fractionation 24, 25, 35  
 Sun, faint young paradox 24  
 Sunsás Orogen 308, 317  
 supercontinent cycles 8, 18, 21, 22, 23, 36, 69–70, 211  
 geodynamic model 33, 34  
 preservation bias 214–215  
 Superior Craton 6, 42, 45, 265, 266, 272  
 crustal structure 49, 50, 61  
 superplumes, Precambrian 18, 33, 36  
 surface wave tomography 51–52, 61  
 Svecokarelian Orogeny 282  
 Svecokarelian Province 282, 283  
 Sveconorwegian Orogeny 284  
 Sveconorwegian Province 281  
 age revision 293–295  
 crustal growth and reworking 295–297  
 geology 282, 283–284  
 juvenile magmatism 297, 298  
 U–Pb and Hf zircon geochronology 285–298  
 SWEAT correlation 70, 75
- Taiwan, arc–continent collision 4
- Talkeetna island arc 3, 4
- Tarbet supracrustals 263  
 zircon geochronology 267, 268, 270, 271, 272, 274
- Tarim Block 72, 73
- Tasmanides, convergent margin 208, 209, 306
- tectonic switching 305, 309, 310, 315–316
- tectonics *see* plate tectonics
- Teleseismic Western-Superior Transect (TWIST) 46
- Thelon Orogeny 45
- Ti thermometry, zircon 204, 205
- tonalite  
 Isua supracrustal belt 115, 117, 123, **125**  
 Ukrainian Shield 229
- tonalite–trondhjemite–granodiorite (TTG) 6, 7, 8, 19  
 Azov Domain 230  
 Eoarchaean proto-arcs 7, 129  
 EPT and BGGT 84, 85, 87, 88, 89, 91, 100–103  
 Isua supracrustal belt 122, 126  
 La/Yb ratio 21  
 Lewisian Gneiss Complex 262  
 in PCO 96, 97  
 western Dharwar Craton 136
- Torridonian Supergroup 263, 264, 269
- Trans-Hudson Orogen (THO) 42, 44, 49, 60, 61  
 crustal structure 49, 50, 57

- Transscandinavian Igneous Belt 282, 283  
 crustal growth and reworking 295–298  
 zircon geochronology 285, **286–287**, 289–293  
 trench retreat 4, 5  
 true polar wander 23  
 Tsumkwe–Tarikora Massif 166, 170  
 Tuke River orthogneiss 324, **336**, 340, 341
- U–Pb zircon geochronology 197, 198, 213, 261  
 Andean convergent margin 311–318  
 Fennoscandian Shield 285–298  
 Fransfontein Granite Suite 169, **173–175**, 183–185  
 Huab Metamorphic Complex 168, **175–176**,  
 185–187  
 Isua supracrustal belt 116, 117, 119, 121, 123  
 Kadiri greenstone belt 144–145  
 North Atlantic Craton 266–275  
 Western Province gneiss 328–331, **332–337**, 339,  
 341, 342, 343
- U–Th–Pb zircon geochronology 229, 232–257  
 Fedorikovka metasediments 246, **248–249**  
 Kozachy Yahr enderbite **238–239**, 243–244, 247  
 Odesa enderbite **240–242**, 243, 244–245, 247  
 Soroki metasediments 246, **250–251**
- Ukrainian Shield  
 geology 228–231  
 zircon geochronology 232–257
- ultramafic rock, Isua supracrustal belt 116, 117, 118
- Ungava Peninsula 42, 44
- uniformitarianism tectonic paradigm 5–8, 83–84
- Vaggeryd–Vårdgårda intrusions 283, **287**, 293  
 volcanic arcs 3–4  
 volcanic plateaux 3, 4–5, 8  
 crustal evolution model 84, 85, 103–104  
 EPT and BGGT 87, 88, 99–103  
 continuous mantle melting 102  
 source of water 102–103
- volcanic rocks, Kadiri greenstone belt 138–158  
 alteration 145, 146  
 andesite suite petrogenesis 147–149  
 basalt suite petrogenesis 145–147, 148  
 dacite–rhyolite 141–145, 148, 149–152, 154, 155  
 plume v. subduction-related source 152–153  
 tectonic evolution model 153, 155
- volcanism  
 degassing 24, 25  
 episodicity 24, 30, 33  
 EPT and BGGT 84, 86  
 and mantle temperature 20–21  
 Volyn Domain 228, 229
- Waitangitaona River paragneiss 324, **333**
- water  
 mantle 6, 103, 205  
 volcanic plateau model 102–103
- weathering, Isua supracrustal belt 120, 121, **125**, 126
- western Dharwar craton, geology 136, 137
- Western Province, gneiss  
 geology 324, 325–326  
 petrogenesis 347–350  
 zircon U–Pb REE–O–Hf 327–347  
*see also* orthogneiss; paragneiss
- Whataroa Quarry orthogneiss 324, **337**, 340,  
 342, 343
- wiggle-matching 261
- Wilson cycles 42, 61, 84, 227
- Xiaofeng dykes 71, 72
- Yamayo Group 310, 311
- Zakhidnopryazovska Series 231
- zircon 197–218, 323, 325  
 age distribution 19  
 continent formation, Hadean 6, 202–205  
 detrital 197, 206, 269  
 Scotland 269–275  
 Hf isotopes 197, 198–199, 204, 205, 325  
 Andean convergent margin 306–308, 311–318  
 mantle 17, 18, 20  
 Ukrainian Shield 232, 235, 242  
 Western Province gneiss 327  
 Hf–O isotopes 202, 213, 235  
 inclusions 204  
 isotopic trends  
 global 209–211, 212  
 regional 208–209  
 Jack Hills region 198, 202–205  
 Li isotopes 204–205  
 Lu–Hf isotopes 199, 202–204, 325  
 model ages 199–201, 212, 213  
 oxygen isotopes 198–199, 201–202, 204,  
 206–207  
 Western Province gneiss 325–350  
 plate tectonic onset 205–208  
 preservation bias 214–215  
 Sm–Nd isotopes, Ukrainian Shield 232, 233  
 Ti concentration 204  
 U–Pb isotopes *see* U–Pb zircon geochronology  
 Ukrainian Shield 231, 232–257  
 Western Province gneiss 326–350  
 Zr/Y ratio, Kadiri greenstone belt 141, 144