Index

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

Aira Caldera (Japan) 74
Alaska 125, 130
Alicudi (Aeolian Islands) 130
Altiplano-Puna Volcanic Complex (APVC) eruption mechanisms 55–56
geochemistry/petrology 51
initiation of activity 49–51
recent activity 48, 51
setting 47–48, 48–49
substructure 51–55
summary of ignimbrite flare-up mechanism 57–59
thermo-mechanical model 56–57
Andes 121
see also Altiplano-Puna Volcanic Complex
Argentina see Altiplano-Puna Volcanic Complex
Askja Caldera (Iceland) 85, 87
Augustine volcano (Alaska) 122, 125, 130
Backbone Range (Japan) 69, 72
Bandai-san (Japan) 122, 128, 129
Bardarbunga (Iceland) 87, 88
Beyzymianny (Russia) 128
Bingham flow 165
Bishop Tuff 3, 4, 173
Bolivia see Altiplano-Puna Volcanic Complex
Bolsena Caldera (Italy) 74
Bouger anomalies
Campi Flegrei 30
Mt Etna 184
boundary-element method 93
bradyseisms 27
bulk strengths of volcanic edifices 126–127
Caldera Taburiente (Canary Islands) 121, 122
California see Long Valley Caldera
Campanian Ignimbrite 25, 141, 159
Campi Flegrei Caldera (Italy) 25, 69, 74
eruptions
history 141–143
potential 154–155
explosive events 159–160
ground motion 26–29
geological setting 25, 145, 159
ground motion 26–29
historic 144–145
prehistoric 144
hazard mapping 38–40
methods 166
results 167, 168
results discussed 169–170
magma chamber
intrusive activity 152–153
reservoir modelling 153, 154
seismic evidence 29–33
map 26
model outputs
hazard estimation 38–40
pyroclastic fallout 40
modelling behaviour
impact of gravity changes 33–37
impact of ring faults 37
pyroclastic density currents 165–166
pyroclastic fallout 40, 160–165
uplift 114–116
use of models in hazard forecasts 38
Serapis studies 143, 147
ground motion 144, 148–150, 151, 152
reference horizons 146, 148
Canary Islands 124, 129
Cumbre Vieja 124–125
tsunamigenic potential 132–137
El Hierro 126, 130, 133, 135
Roque Nublo 128
Taburiente, Caldera 121, 122
Cape Verde Islands 122
Casita (Nicaragua) 122, 127, 128
Chile 128
see also Altiplano-Puna Volcanic Complex
Chon–Aike Province 47
Citara Formation 181
CO$_2$ emissions, Mammoth Mt 9
cohesive strengths
lavas 127
pyroclastics 127
Colima (Mexico) 126, 127, 128
collapse calderas 84
Iceland 87–90
mode of formation 70–72
modelling
analogue 90–92
analytical 92–93
numerical 93–94
pluton emplacement effects 74–76
magma emplacement 66–69
magma reservoir depth 74
magma reservoir shape 72–74
magma upwelling 66
precursory doming 69
ring faults 84
associated stress fields 94
dips 85–86
formation 94–96
formation modelling
layered 101–102
non-layered 96–101
model testing 103–105
structures 102–103
shapes 84
structural styles 69, 70
volumes 86–87
Colle Jetto Formation 181
composite volcanoes
collapse calderas 84
Iceland 87–90
modelling
analogue 90–92
analytical 92–93
numerical 93–94
INDEX

ring faults 84
associated stress fields 94
dips 85–86
formation 94–96
formation modelling 96–102
model testing 103–105
structures 102–103
shapes 84
structural styles 69, 70
volumes 86–87

defined 83
lateral collapse on marine volcanoes
events through time 121
factors affecting 125
large volume events 125–127
marine environment 129–131
triggers 127–129
tsunamigenic potential 131–132
Cumbre Vieja 132–137
Coulomb stress changes, Campi Flegrei 30
crustal structure modelling for Mt Epomeo 184–185
Cumbre Vieja (Canary Islands) 124–125, 132–137
deformation
modelling for Mt Epomeo 185–186
record for Campi Flegrei 34–37
Devil’s Postpile flows 3, 4
diapirism 66
doming see uplift
downsag structure 69, 70
dyking 66
earthquakes and seismicity
Altiplano-Puna Volcanic Complex
mapping with seismic waves 51–55
Campi Flegrei intensity record 28, 29
Long Valley Caldera 9, 15, 173
(1989) 7–9
(1990–1995) 9–11
(1996) 11–12
(1997–1998) 12–16
(1998–1999) 16
summary 21–22
Mt Epomeo 185
Eastern California Shear Zone 1, 2
Ecuador see Sierra Negra Caldera
El Hierro (Canary Islands) 126, 131, 133, 135
epicentres, Long Valley Caldera 8, 15
Epomeo, Mount
activity phases 182
map 182, 183
formation 181
modelling resurgence 182–183
bending model 183–184
crustal structure 184–185
deformation 185–186
bending-lifting model 186–190
summary of model output 190–191
Etna (Italy) 126, 128, 131
Eureka Valley (USA) 8
faults
role in caldera collapse 187
role in caldera uplift
model application
Campi Flegrei 114–116
Sierra Negra 116–117
model framework 111–114
finite element method 93
Fish Lake Valley (USA) 8
Fuji (Japan) 126
funnel structure 69, 70
Galapagos Islands 87, 122, 129
see also Sierra Negra Caldera
Gamkandra (Indonesia) 124
Geitafell Caldera (Iceland) 87, 90, 95
geochemistry
Altiplano–Puna ignimbrites 51
gеotechnical properties and lateral collapse 126–127
Glass Mt Complex (USA) 3, 4, 8, 173
ground inflation
causes 109
model framework 111–114
application of model
Campi Flegrei 114–116
Sierra Negra 116–117
Hafnarfjall Caldera (Iceland) 87, 90, 91
Hawaiian Islands 87
lateral collapse 121, 126, 129, 130–131
tsunamis 132
volcanic landslides 122, 123, 125
hazard assessment
importance of ground inflation 109
mapping at Campi Flegrei
methods 166
results 167, 168
results discussed 169–170
modelling
hazard estimation 38–40
pyroclastic fallout 40
Henry Mt (USA) 69
Hofsjökull (Iceland) 88
Honshu Arc (Japan) 72
Iceland
collapse calderas 87
outwith volcanic zones 89–90
within volcanic zones 87–89
ignimbrite flare-ups 47
mechanism of 57–59
ignimbrite provinces see Altiplano–Puna Volcanic Complex
ignimbrite shields 48, 55
Iliwerung (Indonesia) 124
Indonesia 122, 124
INDEX

inflation see ground inflation
Inyo Domes 3, 4, 8
Ischia Island (Italy) 181
  activity phases 182
  map 182, 183
  modelling resurgence 182–183
  bending model 183–184
  crustal structure 184–185
  deformation 185–186
  bending-lifting model 186–190
  summary of model output 190–191
Ishizuchi cauldron (Japan) 74
  isotope characteristics, Altiplano–Puna Volcanic Complex (APVC) 52
  isotropic and homogeneous half-space models (IHM) 110, 111–114
Italy see Campi Flegrei Caldera; Etna; Ischia Island; Stromboli; Vesuvio
Japan 69, 72, 74
  lateral collapse events 121, 122, 124, 126, 128, 129, 131–132
Kakeya Caldera (Japan) 69
Kamchatka (Russia) 128
Kilauea (Hawaii) 74, 126, 130
Komaga-Take (Japan) 122, 124
Krafla Caldera (Iceland) 89
Kratkaatu (Indonesia) 124
laccolith models for caldera collapse 67–69, 74–76
  Mt Epomeo
    bending 183–186
    bending-lifting 187–190
Lachlan Fold Belt 47
Latera caldera (Italy) 74
lateral collapse
  events through time 121
  factors affecting 125
  large volume events 125–127
  in marine environment 129–131
  triggers 127–129
  tsunamigenic potential 131–132
  Cumbre Vieja 132–137
Lithodomus lithophagus 26
Long Island (Papua New Guinea) 124
Long Valley Caldera (USA)
  formation 173
  geodetic monitoring 174–175
  geography 1
  history 3
  magma–tectonic interactions 16–18
    magma source modelling 173–174
    distributed source 177
    single source 175–177
    summary of model outputs 177–179
  magmagenesis 19–21
  seismogenesis 18–19
  map 2, 4, 6, 174
  tectonic setting 1, 3
  unrest events 3–5
(1989) 7–9
(1990–1995) 9–11
(1996) 11–12
(1997–1998) 12–16
(1998–1999) 16
  summary 21–22
magma processes and caldera formation 65
  pluton emplacement effects 74–76
    magma emplacement 66–69
    magma reservoir depth 74
    magma reservoir shape 72–74
    magma underpressure 94–96
    magma upwelling 66
Mammoth Mt (USA) 3, 4
  earthquakes 7, 8, 21–22
Martinique 129
Mauna Loa (Hawaii) 74, 126, 130, 131, 132
  mega-tsunami defined 123
Mexico 126, 127, 128
Mina Deflection (USA) 2, 3
modelling methods applied
  Altiplano–Puna Volcanic Complex
    thermo-mechanical model 56–57
Campi Flegrei behaviour
  hazard estimation 38–40
  impact of gravity changes 33–37
  impact of ring faults 37
  magma reservoir 153, 154
  pyroclastic density currents 165–166
  pyroclastic fallout 40, 160–165
  uplift 114–116
  use of models in hazard forecasts 38
collapse calderas and ring faults formation
  analogue 90–92
  analytical 92–93
  layered 101–102
  non-layered 96–101
  numerical 93–94
  testing models 103–105
Epomeo, Mount resurgence 182–183
  bending model 183–186
  bending-lifting model 186–190
  summary of model output 190–191
Long Valley Caldera magma–tectonic interactions 16–18
  magma source modelling 173–174
  distributed source 177
  single source 175–177
  summary of model outputs 177–179
Sierra Negra uplift 116–117
Mogi model 92, 109, 111–112, 173
Mono Domes (USA) 3, 4, 8
Mono Lake (USA) 3, 4, 8
Mono-Inyo Craters (USA) 173
Mount Epomeo Green Tuff 181, 189
Naples, Bay of see Ischia Island
Neapolitan Yellow Tuff 25–26, 141, 145, 159
New Zealand 47
Nicaragua 122, 127, 128
Norikura volcanic chain (Japan) 72
nucleus of strain model 92
INDEX

Oskuvatn Caldera (Iceland) 85
Okueyama caldron (Japan) 74
Onikobe caldera (Japan) 72
Oshima-Oshima (Japan) 122
overburden failure and caldera collapse 187–190
Owens Valley Graben (USA) 2, 3, 8

Pantelleria (Italy) 74
Papandayan (Indonesia) 122
Papua New Guinea 122, 132, 134, 135–136

petrology

Altiplano–Puna ignimbrites 51
Philippines 124

Phlegraean Volcanic District see Campi Flegrei Caldera
piecumal structure 69, 70
pit craters 95
Piton de la Fournaise 122, 126, 129, 131
Piton des Neiges 122, 126, 129
Piton du Carbet 129
plate structure 69, 70
pluton formation 65
tabular style 69, 74, 76
pluton-caldron link 65–66
pozzolana 145
Pozzuoli (Italy) 142
gleological setting 145
subsidence and uplift 144–145
Pozzuoli, Gulf of (Italy) 25, 26
subsidence 26–28
wave velocities 32
pyroclactic density currents (PDC)
Campi Flegrei
hazard mapping 166–170
modelling 38–40, 160–165
factors affecting 159
pyroclastic fallout
modelling at Campi Flegrei 40, 160–165

Rabaul (Papua New Guinea) 74
Rainier, Mt (USA) 126, 127, 128
rare earth elements

Altiplano–Puna ignimbrites 51
Red Cones cider cone (USA) 3, 4
resurgence modelling, Mount Epomeo 182–183
bending model 183–186
bending-lifting model 186–190
summary of model output 190–191
Réunion Island 122, 126, 129
Reykjadalur Caldera (Iceland) 87, 90
ring dykes 85–86
ring faults 84–85
dips 85–86
formation by magmatic underpressure 94–96
formation modelling
layered 101–102
non-layered 96–101
model outputs 103–105
structures 102–103
Ritter Island (Papua New Guinea) 122, 124, 132, 134, 135–136
Roque Nublo volcano (Canary Islands) 128
Ruau (Indonesia) 124
Russia 121, 128

St Helens, Mt (USA) 121, 122, 125, 128, 134
San Juan Mts (USA) 47
Santorini (Greece) 124
Sciarra del Fuoco (Stromboli) 121–122, 131, 132
seismic imaging

Altiplano–Puna Volcanic Complex (APVC) 51–52
reservoir shape 72–74
see also earthquakes and seismicity
seismic wave velocity 31
Serapis Temple (Italy) 143, 147
gleological setting 145
history of ground movement 27, 144, 148–150, 151, 152
reference horizons 146, 148
shear failure 126
sheeted intrusions 67
Sierra Madre Occidental (Mexico) 47
Sierra Negra Caldera (Galapagos) 116–117
sinkholes 95
Socompa (Chile) 128
stratovolcanoes
defined 83
see also composite volcanoes
Stromboli (Italy) 121–122, 127, 128, 130, 131, 132

Ta’al (Philippines) 124
tabular plutons 69, 74, 76
Taburiente, Caldera (Canary Islands) 121, 122
Tambora (Indonesia) 124
Taupo Volcanic Zone (New Zealand) 47
Tavua (Fiji) 74
tephra
factors affecting distribution 159
modelling fallout 40, 160–165
Torfaajökull (Iceland) 87, 89, 90
trace elements

Altiplano–Puna ignimbrites 51
trapdoor structure 69, 70
tsunami generation 121–122, 123, 124
by lateral collapse 131–132
Cumbre Vieja case study 132–137
underpressure and ring formation 94–96
Unzen, Mt (Japan) 122, 124, 129, 131–132
uplift and doming 69, 109
caldera formation 69–72
modelling behaviour 111–114
application of model

Campi Flegrei 114–116, 153
Sierra Negra 116–117
patterns at Campi Flegrei 27–29
reservoir factors
depth 74
shape, geophysical evidence 72–74
summary of features 74–76

Vatnajökull (Iceland) 87, 88
Vesuvio (Italy) 73, 74
volcanic field, defined 85
volcanoes
see composite volcanoes also stratovolcanoes
volcano-tectonic depressions (VTD) 48, 55

Yellowstone Caldera (USA) 69