INDEX

Abramov Glacier station 381
Abramov Glacier, mean monthly temperature and precipitation 381
absolute vorticity 128
accidents due to lightning 458
acclimatization 453
accretion of ice on power lines 322
actual evaporation 394
acute mountain sickness 446–447
adaptations 452–456
adret 397, 483–485
Adriatic Sea 176
Advanced Regional Prediction System (ARPS) 230
aerobic working capacity 454
aerodynamic method 330–331
aerosol 461
aerosol concentrations 37
air avalanches 193
air pollution 460–468
air pressure 32
air pressure and altitude 445
airflow over mountains, theories 152–154
Alaska 107
Alberta 173
ALPEX 142, 145, 178
alpine 3
Alpine Experiment (ALPEX) 11
alpine glaciers 482–485
alpine lee cyclogenesis 145
alpine micro-climates 96
Alpine Surface Radiation Budget (ASRB) 41
Alps 40, 42, 74, 97, 107, 138, 141, 181, 258, 271, 274, 305, 335, 386–397, 480
Alps, lee cyclones 149
Alps, radiation studies 251
Alps, regional compensation flow 217
Alps, regional evapo-transpiration 341
Alps, seasonal precipitation characteristics 390
altitude 31–72
altitude effect on (direct) solar radiation 35
altitude effects on sky radiation 42
altitude of maximum precipitation 286
altitudinal characteristics 282–288
altitudinal effects on solar radiation 38–42
altitudinal gradient of air temperature 57
altitudinal gradients of precipitation 421–421
altitudinal gradients of soil temperature 57–58
anabatic 187
anabatic slope flows 191
Andean Quechua 453
Andes 128, 421–426, 453
gle of repose 459
annual temperature range 26, 27
Antarctic 128
Antarctic Peninsula 133
Antarctica 159, 183–185, 416–419
Antarctica, katabatic wind regime 418–419
Appalachian Mountains 136, 264, 298
Appalachians 142
areal representativeness of a gauge 313–314, 318
aridity 380, 414
Arunachal Pradesh 375
Asekreme 379, 381
aspect 87–96
aspect ratio 82
Atacama Desert 423
Austria 50, 105, 295
Austrian Alps 40, 42, 48, 60, 255, 323, 339
automatic weather stations 15
Auvergne 314, 322
avalanche forecasting 460
balloon ascents 446
banner clouds 169
baroclinic atmosphere 127
barotropic atmosphere 127
barrier width 74
barrier winds 132–138
Barrow, Alaska 98
base of cumulus cloud 269
Bavaria 265
Bavarian Alps 287
INDEX

Beer’s Law 36
Ben Nevis 29, 261, 399, 449
Ben Nevis Observatories 397
Ben Nevis Observatory 6
Bergeron-Findeisen mechanism 270
Bergeron-Findeisen process 270
Bernese Plateau 396
Bernoulli effect 71
Bernoulli equation 84
Big Thompson flood 405
billows 170
birth weights 453–454
bise 395–396
blocking effects 132–138
blowing and drifting snow 323–328
blowing snow 451
blowing snow, rate of transport of mass 327
Blue Ridge 157
Bolivia 284
bora 175–179
bora at Senj 176
bora days climatological characteristics winter 177
bore 159
Boulder, Colorado 161, 178, 179
boundary layer 74
boundary layer flow 228
Bowen ratio 107, 255, 329, 340
Bowen ratios 253
bristlecone pine 481
Britain 289
British Columbia 302
Brocken 61
Brooks Range 135–136
Bruit-Vāisālā frequency 132, 153
Brush Creek 208
Brush Creek Valley, Colorado 201, 463
C.W. Thornthwaite 329
Cairn Gorm 397, 399
Cairn Gorm, climate 399–400
Canadian Arctic 339
Canary Islands 164
cap cloud 168–169
Cape Dennison 184, 185
Cape Farewell 134
Carbon River Valley 211
Carpathain Mountains 80
Cascade Mountains 142, 278, 303
Cascade Mountains, Washington 289
Cascade Range 322
catch of snow 310, 313
Cauca Valley, Colombia 186
Caucasus 253, 255, 257, 258, 259, 335, 483
Central Alps of Japan 282
Central America 274
Central Asia 381–386
Central Asia, solid precipitation 384
Central Sierra Snow Laboratory 335
Cévennes 282
changes in mountain climates 474–488
changes on Alpine glaciers 486
characteristics of mountain areas 2–5
Cherrapunji 375
chirnook 170
Chitistone Pass, Alaska 104, 107
chronic mountain sickness 454–455
Churchill, Manitoba 91, 92
circulation systems related to orography 125
clear-sky direct beam transmissivity 39
climatic characteristics of mountains 251–342
climatic regionalization 12
climatic snow line 383
clo 451–452
clothing 451–452
dropout growth 269
droplet effects on UV radiation 46
droplet forest 312, 318
droplet forms 168–170
droplet modification factor (CMF) 46
droplet reporting 271–272
droplet systems 376
droplet time delay 305
droplet type 270–271
dropletiness 398
droplets 266–272
Coandă (wall attachment) effect 80
Coast Ranges 286
coastal Alaska 133
Coastal Range in Oregon 282
Col de Porte 480
cold air damming 136, 142, 159
cold air lake 216, 264–266
cold air pool 175
cold effects 447–451
cold fronts 140
cold lows 288
cold pool 209
cold stress 449–450
Colombia 421–422
Colombia (Serrania de Macuira) 313–314, 318
Colorado Front Range 107, 326
Colorado River Valley 217
Colorado Rockies 314, 322
Colorado Rockies, winter storm precipitation 404
Colorado Rocky Mountains 218
complex terrain, controls of atmospheric diffusion in 462–468
computer programs to calculate solar radiation 91–94
concave landforms 104
condensation, amount 278
continence 26–31, 393
convection events 282
convective cloud system 274
convex landforms 104
Cordilera Darwin 425
coreless winter 417
Coriolis parameter 75
corner effect 137
Cotopaxi 253
Craigieburn Range 29
creek 324
crest cloud 405
Cristo Redentor 424
critical layer 231
critical level 158
Croatia 258
Cross Fell 169, 176
cross-valley winds 206, 215
Cwm Dyli 398
cyclogenesis in the northern hemisphere 143
cyclones in the lee of the Alps 144–148
daily temperature fluctuation 60
Dalton’s equation 330, 334
Davos 196, 204, 335
De Beque basin 209
deep valleys 79, 103
definitions of mountain areas 2–3
density 32
deposition on horizontal surfaces 323
depth hoar 459–460
Desert Andes 423
Dhaulagiri Himal 374
diabatic heating 125
differential pressure effects 138
diffuse radiation 42
diffuse radiation on a slope 90–91
digital elevation model (DEM) 104, 107
dimensional effects 73–81
Dinaric Alps 177
direct beam solar radiation for sloping surfaces 106
direct radiation 38, 87, 89–90, 105
directional correlation coefficients 212
directional relief 100
Dischma Valley 204, 208, 255, 311, 315, 322, 339–340
Dischmatal 340
diurnal range of temperature in the free air 59–60
diurnal temperature range 400, 476
diurnal temperature range in sinkholes 190
diurnal variation of lapse rate 400
dividing streamline 76, 166
dividing streamline concept 468
Dome C 417
Dome C, energy budget 417
Double Fenced Intercomparison Reference (DFIR) gauge 308–309, 316
downslope flow, theories 195–196
downslope windstorm 161
downslope windstorm events 178
Drakensberg 197, 211, 218
drift surface, slope 325–326
drifts 326
droplet coalescence 269
dry adiabatic lapse rate 52, 267
dry subtropical Andes 423–425
Dun Fell 310, 317
Dunde ice cap 413
dynamic pressure gradient 81
dynamic wind pressure 322
East Africa 365–368
eastern Alps 285, 294
eastern Nepal, precipitation 369
eastern Pamir 483
eddy correlation method 332
(blocking) effect 68
effect of altitude on diffuse (sky) radiation 41
effect of cloud cover on solar radiation 42
effect of mountain cross-profile on wave motion 162
effect of slope aspect on precipitation 309–310, 316
effect of slopes in terms of net radiation 94
elevation effects in complex terrain 286–287
Emley Moor, Pennines 322
energy balance method 329–330
energy budget closure 258–259
energy budget data 256
energy budget of a mountain climber 448
energy budgets 251–259, 412
energy conversion factors 495
England 283
envelope orography 130–131
environmental lapse rate 52
equation for conservation of potential vorticity 126–127
equatorial and tropical Andes 421–423
equatorial Andes 284
equatorial mountains 363–368
equilibrium line altitude 482
equilibrium temperature theory 108
equivalent potential temperature 69
errors in the measurement of liquid and solid precipitation 306–307, 316
evrhythmic radiation 44
Ethiopia 283
European Alps 128, 143, 309–310, 316
European Alps, snow lines 81
evanescent waves 153
evaporation 107
evaporation from mountain areas 338
INDEX

evaporation pans 332
evaporation processes and methods of calculation 328–333
evaporation, measurements 332–333
evaporation–sublimation rates 337
evapotranspiration 98, 328
evapotranspiration, combination methods 331–332
evapotranspiration, Penman’s equation 331–332
evidence of climatic fluctuations 474–485
exposure 100, 101, 312, 318
Fedtchenko Glacier 382
Fedtchenko Glacier, mean monthly temperature and precipitation 382
Feldberg 315, 322
fetch 100
First Law of Thermodynamics 266
flood 403–404
floods 392
flow over heated obstacles 77
flow separation 84–86, 101
fog 64, 396–397
fog interception 313, 318–319
fog precipitation 311, 317–319
fog-trap 311, 317
föhn 394–395, 452
föhn nose 138, 173
föhn wall 405
föhn wind 170–175
föhn winds, classification 172
föhn, mechanism 170–172
forced ascent 266, 274
form drag 71, 125, 130, 133
fractal dimension 295
fraction of annual precipitation falling as snow 293–294
fraction of mean annual precipitation in solid form 383
fractional speed up ratio 82–83
Fraser Experiment Station 337
Fraser Experimental Forest 335
free air 12
free-air temperatures 477
freezing level 292, 423, 481
freezing precipitation 399
French Alps 150
friction 125
frictional drag 71
Front Range, Colorado 107, 204, 252, 297, 401
frontal modifications 138–142
frost hollows 187–190
frostbite 451
frost-free season 400
Froude number 76–77, 109, 182, 185, 186
fumigation 463
gap winds 79–80
gauge shielding 308, 316
Geophysical Fluid Dynamics Laboratory model 126
geo-statistical approach to mapping precipitation 291–292
Gibbs phenomenon 129
Glaciar Echaurren Norte 425
glaciation level 427
glacier basins 297
Glacier National Park 100
glacier recession 483–485
glacier recession in New Zealand 485
glacier retreat 368
glacier surfaces 255
glacier wind 211
glaciers European Alps 397, 483–485
glaciers in Southern Alps 426
global area of mountains 4
global dimming 474
global radiation 45
global solar radiation 252
global solar radiation in valley 105
Gore Creek 209
Gore River Valley 213
gradient of maximum temperatures in Great Britain 55
Great Britain 215, 216
gravity wave breaking 130
gravity waves 74, 84, 129
gravity-wave drag 129, 131
Great Britain 397–401
Great Dividing Range in Australia 142
Great Dun Fell 83
Great Himalaya 368
Great Salt Lake Basin 223
Greenland 183, 185, 420–421
Greenland ice sheet 138, 420
Grosswetterlagen 386
ground temperatures 102, 477
group velocity 157
growing season 265
Güsterternalm 188, 190
Gulf of Alaska 79
Gulf of Tehuantepec 79–80
H.B. de Saussure 6
Halde Observatory 335
Hawaiian Islands 77
heat capacity 30
heating effect over a high plateau 67–68
heavy rainfall in Alpine valleys 211
helm wind 176
High Atlas 337
INDEX

high plateaus 411–421
hill fog 271
Himalaya 209–211, 368–378, 482
Hinterreisferner 341
history of research 5–11
hoarfrost 323
Hochgebirge 3
Hoggar 149–150, 284, 378–381
Hohenpeissenberg, Bavaria 102, 311, 312
horizon screening 90, 104
horizontal diffusion 131
horizontal resolution of GCMs 129
human bioclimatology 444–456
human energy budget 447–451
Huntingdon Canyon, Utah 464
hydraulic jump 137, 159–161, 175, 183, 186
hydrological balance calculations 329
hydrological budget 315, 322
hydrological precipitation 312, 317–318
hydrometeors 306–307, 316
hydrostatic equation 266
hydrostatic meso-scale models 228
hydrostatic pressure gradient 81
hygric continentality 30
hyperventilation 446
hypothermia 450
hypoxia 444–445

ice plateaus 415–421
Icefield Ranges Research Project 407
Idaho 270
Indian monsoon 369, 482
Indian Peaks, Colorado 100
indices of continentality 29
inertial circle 134
influence height 81
infrared radiation 47–49
Inn Valley 197, 206, 207, 217, 261
Innsbruck 171, 174, 175
instrumentation 14–16
internal Froude number 142, 159
inverse distance weighting 291
inversion break-up 463–464
IR radiation 95
isentropic flow 126
isochrones of a cold front 141
Italian Alps 475

Jan Mayen 163
Japan 308, 316
jet stream 128
Jungfraujoch 326, 474
Kali Gandaki Valley 209
Kananaskis Valley 215
Kanchenjunga 374
Karakoram 377, 466
Karakoram-Himalaya 371
Karkonosze 311, 314, 317, 320
Kashmir 371
Kaskawulsh Glacier 407, 408
katabatic 187
katabatic flow 463
katabatic flows, theoretical approaches 191–193
katabatic winds 186
Khasi hills 375
Khumbu 376
Khumbu region 375
kinetic energy 74, 75, 109
kriging 291
krummholz 99

La Paz 454
laboratory experiments 128
laminar streaming 150
Land Surface Model (LSM) 254
Langtang 374
Langtang Valley 376
lapse rate, changes 477
lapse rates 53–55
large-amplitude disturbances, theories 158
Large-Eddy Simulation (LES) 230
large-scale shelter 102
Late Cenozoic 126
latent heat fluxes 107
latitude 24–26
lee cyclogenesis 143–150
lee wave amplitude 157
lee waves 129, 150
lenticular cloud 163
lenticular clouds 169
Lesser Himalaya 368, 372
level of free convection 266
lifting condensation level 266, 269
lightning 456–458
lightning activity level (LAL) 456, 457
lightning strikes 457–458
limited area prognostic models 229–230
Little Ice Age 485
local airflow modification 150–170
local shelter 102
loose-snow avalanche 459
low-level jet 136, 142, 208
lung capacity 454
lysimeter 333

Maloja wind 211–212
mapping topoclimatic variability 103
Maritime Alps 80
maritime mountains 397–401
INDEX

Marsyandi River Basin 370, 373
mass balance observations 482
mass balance, changes 483
mass budget equation 206
mass conservation models 227–228
mass-elevation (Massenerhebung) effect 65
Massenerhebung (mass-elevation) 393
Massif Central 137
Maunaloa, Hawaii 274, 308–309, 312, 316, 317–318
Mawson 184
Mawsyuram 375
maximum barrier wind speed 134
maximum drag 158
McCall Glacier 192
mean annual ground temperatures in the Alps 97
mean diurnal temperature range 24
mean horizon angle 95
measures of continentality 29
MERKUR 207
MERKUR project 217
Mesoscale Alpine Program (MAP) 15, 163, 278, 380
Mesoscale Experiment in the Region Kufstein-Rosenheim (MERKUR) 206
meso-scale models of snow transport and accumulation 328
meso-scale precipitation areas (MPAs) 275
meso-scale range 72
meteorological precipitation 311
Mexican Plateau 223, 299
microclimates 96–101
microclimatic gradients 97–101
Mie scattering 36
Mistral 137–138, 183
Mittelgebirge 3
modeling of pollutant dispersal 466–467
models of the orographic wind field 226–230
momentum budget 185
Mont Blanc 6, 163–164
Monte Rosa 447
Mount Washington Observatory 7
mountain and valley winds 196–215
mountain and valley winds mean mass budgets 207
mountain basins 217
mountain bioclimatology 444–468
mountain cumulus 269
mountain relief 4
mountain sickness 446
mountain wind 196
mountain wind, periodic fluctuations 211
mountainadoes 166
mountain–plain wind 218
mountain–plains circulation 222
moving window regression 291
Mt. Bandai, Japan 264
Mt. Cameroon 274, 283
Mt. Cook 426
Mt. Elbrus 255
Mt. Everest 374, 445, 446
Mt. Fuji 29, 262, 270, 322
Mt. Jaya 70, 363, 364, 485
Mt. Kenya 274, 365, 366
Mt. Kilimanjaro 365, 367–368
Mt. Logan 252, 255, 410
Mt. Logan, accumulation 410
Mt. Rainer 200
Mt. Rosa 446
Mt. Rose 335
Mt. Stanley 366
Mt. Vitosha 315, 322
Mivelad 424
Nepal 369–370, 373, 376
net infrared radiation on a slope 95
net radiation 49–51, 95, 106
net radiation for sloping surfaces 106
neutral flow 109
Nevado Sajama 422
New Guinea 363–365
New Zealand Alps 426
nival zone 3
Niwot Ridge 29, 253, 255, 325, 339, 402, 406, 449
Niwot Ridge, Colorado 24, 101
nocturnal boundary layer cooling 214
nocturnal low-level jet 225
nocturnal southerly low-level jet 223
non-linear flow over mountains 161
Nordkette 261–262
north Wales 306, 333
northern Norway 323
Northern Patagonia Icefield 425
Northwest Himalaya 107
nowcasting 306
Obergurgl 97, 255, 265
observational problems 306–316
Observatorio del Infiernillo 424–425
Observatorio del Infiernillo, air temperatures 424
Olympic Range 286
optical air mass 35
orientation 87, 104

© Cambridge University Press www.cambridge.org
INDEX

orographic component 299
orographic component, evaluating 288–316
orographic effects on airflow 125
orographic precipitation 275–282, 299
orographic precipitation, physical model 281
orographic precipitation, theoretical models 297–306
oroshi 176, 179
oxygen deficiency 444–447
oxygen partial pressure 444

Palghat Gap 79
Pamir 382–383, 385
Pamir-Alai 381, 383
Pangrango, Java 24
Papua New Guinea 269
Parameter–elevation on Independent Slopes Model (PRISM) 290–291
parcel method 298
Park Range, Colorado 275
partial pressure of oxygen 445
Paso de la Cumbre de Uspallata 424
penitent 333–334
Penman method 333
Pennines 477
permafrost 58, 401, 412–413
perturbation vertical velocity 300–302
Pete Sink 190
phase velocity 157
Pike’s Peak Observatory 401
Pike’s Peak, Colorado 6
plain–mountain winds 218
plains–mountain flows 223
planetary waves 74, 125
planetary-scale effects 125–131
plateau monsoons 30
Poland 104
pollutant plumes 461, 465
pollution characteristics 461–462
pollution concentrations, effect of altitude on 461–462
pollution plume 464
Portugal 291
potential convective instability 269
potential evaporation 394
potential evaporation during Chinook conditions in Alberta 339
potential evapotranspiration 328
potential nocturnal cooling 188
potential temperature of föhn 394
potential temperatures 69, 103
powder avalanche 459
precipitation 273–316, 479–480
precipitation amounts with elevation 388–392
precipitation efficiency 281, 298
precipitation in northwest Britain 398–399
precipitation on Greenland 420–421
precipitation processes 273–282
precipitation, corrected monthly 310, 317
predicting surface temperature 263–264
pressure drag 71
primitive equations of motion 229, 303–304
principal mountain observatories 8–10
probable maximum precipitation (PMP) 292, 405
Program on Arctic Regional Climate Assessment (PARCA) 420
proxy data 481–485
psychometric coefficient 331
Pyrenees 131, 137
Qilian Shan 385–386
Quechua Indians 455–456
Quelccaya 255
Quelccaya Ice Cap 483
radar determinations of precipitation volume 314, 319
radiation condition 153
Rauris Valley 197
Rayleigh scattering 35
reflection from adjacent slopes 91
regional-scale interactions 217–226
relative relief 86
relief effects 81–87
relief roughness 4
representation of geography 130
resonance 153
retardation and distortion of fronts 141
return flow 196
Reynolds averaging 109
Reynolds Creek Experimental Watershed 314, 320
Reynolds number 212
Rhine Valley 212, 215, 395
Richardson number 75, 109, 158, 231
rime 314, 319–323
rime deposits 310, 321
Riviera project 95
Rocky Mountain Peaks Experiment (ROMPEX) 219, 253
Rocky Mountains 98, 100, 127, 128, 132, 143, 170, 171, 182, 225, 279, 282, 286, 335, 337, 457, 476
Rocky Mountains cyclogenesis 143–144
Rocky Mountains in Alberta 288–289, 304
Rocky Mountains of Colorado 299, 336
Rocky Mountains, Colorado 401–406
Ross Ice Shelf 184
Rossby number 132
Rossby radius of deformation 132, 231
rotor clouds 169–170
rotors 84, 98, 150, 161
roughness length 230
runoff 342
<table>
<thead>
<tr>
<th>Term</th>
<th>Page(s)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ruwenzori</td>
<td>368</td>
</tr>
<tr>
<td>Ruwenzori Mountains</td>
<td>365</td>
</tr>
<tr>
<td>sacred places</td>
<td>1</td>
</tr>
<tr>
<td>Sagarmatha National Park</td>
<td>375</td>
</tr>
<tr>
<td>Saharan heat low</td>
<td>149</td>
</tr>
<tr>
<td>salutation</td>
<td>324</td>
</tr>
<tr>
<td>San Antonio Mountain</td>
<td>84, 102</td>
</tr>
<tr>
<td>San Bernardino Mountains</td>
<td>263</td>
</tr>
<tr>
<td>San Francisco Peaks</td>
<td>271</td>
</tr>
<tr>
<td>San Juan Mountains</td>
<td>105, 270, 288, 296–297, 459</td>
</tr>
<tr>
<td>San Mateo Mountains</td>
<td>271</td>
</tr>
<tr>
<td>San Rafael Glacier</td>
<td>425</td>
</tr>
<tr>
<td>Santa Ana</td>
<td>227–228</td>
</tr>
<tr>
<td>Santa Ana winds</td>
<td>173–174</td>
</tr>
<tr>
<td>Santa Catalina Mountains</td>
<td>107, 271</td>
</tr>
<tr>
<td>saturated adiabatic lapse rate</td>
<td>52</td>
</tr>
<tr>
<td>saturation vapor pressure over melting snow</td>
<td>323</td>
</tr>
<tr>
<td>Scorer parameter</td>
<td>76, 154–155, 161</td>
</tr>
<tr>
<td>Scottish Highlands</td>
<td>294</td>
</tr>
<tr>
<td>scud</td>
<td>86</td>
</tr>
<tr>
<td>seasonal lapse rates</td>
<td>260</td>
</tr>
<tr>
<td>seeder–feeder cloud mechanism</td>
<td>273</td>
</tr>
<tr>
<td>Senj</td>
<td>176</td>
</tr>
<tr>
<td>separation</td>
<td>150, 162, 165</td>
</tr>
<tr>
<td>separation point</td>
<td>85</td>
</tr>
<tr>
<td>Seward Glacier</td>
<td>407, 408</td>
</tr>
<tr>
<td>shape of obstacles</td>
<td>84</td>
</tr>
<tr>
<td>shelter</td>
<td>100–101</td>
</tr>
<tr>
<td>sheltering effects</td>
<td>227</td>
</tr>
<tr>
<td>sheltering of individual gauge sites</td>
<td>313, 318–319</td>
</tr>
<tr>
<td>Sheppard’s criterion</td>
<td>75</td>
</tr>
<tr>
<td>shooting flow</td>
<td>177, 195</td>
</tr>
<tr>
<td>Sierra Nevada</td>
<td>133, 169, 279–280, 286, 311, 317, 341</td>
</tr>
<tr>
<td>Sierra Nevada Mountains</td>
<td>304</td>
</tr>
<tr>
<td>sinkholes</td>
<td>188–190</td>
</tr>
<tr>
<td>sinkholes, minimum temperatures</td>
<td>190</td>
</tr>
<tr>
<td>Siwaliks</td>
<td>368, 372</td>
</tr>
<tr>
<td>skin friction</td>
<td>71</td>
</tr>
<tr>
<td>sky view factor</td>
<td>203</td>
</tr>
<tr>
<td>slab avalanches</td>
<td>459</td>
</tr>
<tr>
<td>slope 87–96</td>
<td></td>
</tr>
<tr>
<td>slope angle 87, 104</td>
<td></td>
</tr>
<tr>
<td>slope atmosphere</td>
<td>12</td>
</tr>
<tr>
<td>slope drainage</td>
<td>190</td>
</tr>
<tr>
<td>slope effects on radiation</td>
<td>102</td>
</tr>
<tr>
<td>slope lapse rates</td>
<td>420</td>
</tr>
<tr>
<td>slope radiation</td>
<td>92</td>
</tr>
<tr>
<td>slope winds 187–196</td>
<td></td>
</tr>
<tr>
<td>SNOTEL (Snow Telemetry) network</td>
<td>311, 317</td>
</tr>
<tr>
<td>SNOTEL stations</td>
<td>64–65</td>
</tr>
<tr>
<td>snow accumulation</td>
<td>419</td>
</tr>
<tr>
<td>snow albedo</td>
<td>93</td>
</tr>
<tr>
<td>snow avalanches</td>
<td>458–460</td>
</tr>
<tr>
<td>snow boards</td>
<td>311, 317</td>
</tr>
<tr>
<td>snow cover 97–98, 102, 292–297, 393–394, 423, 451</td>
<td></td>
</tr>
<tr>
<td>snow cover duration 294–295, 393, 480</td>
<td></td>
</tr>
<tr>
<td>snow cover durations in Austria 478</td>
<td></td>
</tr>
<tr>
<td>snow cover effect on downward UV radiation</td>
<td>47</td>
</tr>
<tr>
<td>snow depth 290, 295–296, 480</td>
<td></td>
</tr>
<tr>
<td>snow drift, threshold</td>
<td>325</td>
</tr>
<tr>
<td>snow evaporation</td>
<td>336</td>
</tr>
<tr>
<td>snow generation</td>
<td>281</td>
</tr>
<tr>
<td>snow pack samples for nitrates and sulfates</td>
<td>466</td>
</tr>
<tr>
<td>snow packs, western North America 479</td>
<td></td>
</tr>
<tr>
<td>snow pits 311, 317–319</td>
<td></td>
</tr>
<tr>
<td>snow pressure-pillow</td>
<td>311, 317</td>
</tr>
<tr>
<td>snow sublimation</td>
<td>327</td>
</tr>
<tr>
<td>snow transport, modes</td>
<td>324–325</td>
</tr>
<tr>
<td>Snowdonia 278–279, 280, 283</td>
<td></td>
</tr>
<tr>
<td>snowdrift sublimation</td>
<td>330</td>
</tr>
<tr>
<td>snowfall 292–297, 423</td>
<td></td>
</tr>
<tr>
<td>snowfall at Ben Nevis</td>
<td>399</td>
</tr>
<tr>
<td>snowfall catch 307, 316–317</td>
<td></td>
</tr>
<tr>
<td>snowfall in the mountain ranges of Colorado</td>
<td>402</td>
</tr>
<tr>
<td>snowfall, days 294</td>
<td></td>
</tr>
<tr>
<td>snowline 423, 424, 426, 486, 487</td>
<td></td>
</tr>
<tr>
<td>snowmelt 253–255</td>
<td></td>
</tr>
<tr>
<td>snowmelt model 93</td>
<td></td>
</tr>
<tr>
<td>snowpack 479–480</td>
<td></td>
</tr>
<tr>
<td>soil temperature</td>
<td>107</td>
</tr>
<tr>
<td>solar constant</td>
<td>37</td>
</tr>
<tr>
<td>solar declination angle</td>
<td>87</td>
</tr>
<tr>
<td>solar radiation 34–43, 398</td>
<td></td>
</tr>
<tr>
<td>solar radiation on a horizontal surface</td>
<td>40</td>
</tr>
<tr>
<td>solar radiation on a sloping surface 89–91</td>
<td></td>
</tr>
<tr>
<td>solid precipitation intercomparison project</td>
<td>308–309, 316</td>
</tr>
<tr>
<td>Sonnblick 29, 33, 42, 60, 70, 308–309, 311, 316, 317, 336, 480</td>
<td></td>
</tr>
<tr>
<td>Sonnblick Observatory 6, 287, 336, 475</td>
<td></td>
</tr>
<tr>
<td>soroche 454</td>
<td></td>
</tr>
<tr>
<td>South Asian summer monsoon</td>
<td>413, 415</td>
</tr>
<tr>
<td>south fohn 142, 174–175, 181, 394</td>
<td></td>
</tr>
<tr>
<td>South Island of New Zeland</td>
<td>135</td>
</tr>
<tr>
<td>South Park Basin</td>
<td>217</td>
</tr>
<tr>
<td>South Pole</td>
<td>416</td>
</tr>
<tr>
<td>southeastern Australia</td>
<td>323</td>
</tr>
<tr>
<td>southerly buster</td>
<td>142</td>
</tr>
<tr>
<td>Southern Alps</td>
<td>106, 128, 175, 426</td>
</tr>
<tr>
<td>Southern Patagonia Icefield</td>
<td>425</td>
</tr>
<tr>
<td>Southern Westerlies</td>
<td>425, 426</td>
</tr>
<tr>
<td>spacing of weather stations</td>
<td>14</td>
</tr>
<tr>
<td>spectral truncation 129</td>
<td></td>
</tr>
<tr>
<td>Split 177</td>
<td></td>
</tr>
<tr>
<td>splitting parameter</td>
<td>148</td>
</tr>
<tr>
<td>St Elias Mountains</td>
<td>138, 142, 407, 411</td>
</tr>
<tr>
<td>St. Elias Mountains, summer climatic data</td>
<td>409</td>
</tr>
<tr>
<td>stable stratification</td>
<td>109</td>
</tr>
<tr>
<td>stagnation 75</td>
<td></td>
</tr>
<tr>
<td>Standard Atmosphere</td>
<td>32, 445</td>
</tr>
<tr>
<td>Key Term</td>
<td>Page Numbers</td>
</tr>
<tr>
<td>--------------------------</td>
<td>--------------</td>
</tr>
<tr>
<td>Standing eddy</td>
<td>150</td>
</tr>
<tr>
<td>Standing jumps</td>
<td>186</td>
</tr>
<tr>
<td>Static stability</td>
<td>74, 76</td>
</tr>
<tr>
<td>Station representativeness</td>
<td>388</td>
</tr>
<tr>
<td>Stratification</td>
<td>77</td>
</tr>
<tr>
<td>Streamline analyses</td>
<td>139</td>
</tr>
<tr>
<td>Stress-differential induced convergence</td>
<td>273</td>
</tr>
<tr>
<td>Sub-freezing temperatures</td>
<td>455–456</td>
</tr>
<tr>
<td>Sublimation</td>
<td>329</td>
</tr>
<tr>
<td>Sublimation losses from blowing snow</td>
<td>337–338</td>
</tr>
<tr>
<td>Subtropical westerly jet stream</td>
<td>369</td>
</tr>
<tr>
<td>Summit winds</td>
<td>98</td>
</tr>
<tr>
<td>Sunshine totals</td>
<td>478</td>
</tr>
<tr>
<td>Surface albedo for infrared radiation</td>
<td>94</td>
</tr>
<tr>
<td>Surface boundary layer</td>
<td>185</td>
</tr>
<tr>
<td>Surface inversion</td>
<td>416</td>
</tr>
<tr>
<td>Surface melt</td>
<td>420</td>
</tr>
<tr>
<td>Surface roughness length</td>
<td>84</td>
</tr>
<tr>
<td>Surface temperatures</td>
<td>97</td>
</tr>
<tr>
<td>Surface thermal regime</td>
<td>104</td>
</tr>
<tr>
<td>Surface/free-air temperature difference</td>
<td>64</td>
</tr>
<tr>
<td>Surface-based inversion</td>
<td>417</td>
</tr>
<tr>
<td>Suspension</td>
<td>324</td>
</tr>
<tr>
<td>Swiss Alps</td>
<td>295</td>
</tr>
<tr>
<td>Swiss Jura</td>
<td>377, 466</td>
</tr>
<tr>
<td>Switzerland</td>
<td>314, 321, 326</td>
</tr>
<tr>
<td>Synoptic-climatological catalogs</td>
<td>386</td>
</tr>
<tr>
<td>Synoptic-scale effects</td>
<td>132–150</td>
</tr>
<tr>
<td>Système International (SI) units</td>
<td>495</td>
</tr>
<tr>
<td>Explosion</td>
<td>311</td>
</tr>
<tr>
<td>Tamanrasset</td>
<td>317</td>
</tr>
<tr>
<td>Tailored gauges</td>
<td>311, 317</td>
</tr>
<tr>
<td>Table Mountain, Capetown</td>
<td>311, 317</td>
</tr>
<tr>
<td>Tamaranisset</td>
<td>379</td>
</tr>
<tr>
<td>Temperature</td>
<td>52–70, 259–266</td>
</tr>
<tr>
<td>Temperature differences</td>
<td>61</td>
</tr>
<tr>
<td>Temperature inversion</td>
<td>52</td>
</tr>
<tr>
<td>Temperature trends</td>
<td>475–478</td>
</tr>
<tr>
<td>Temperatures at summit stations</td>
<td>60–64</td>
</tr>
<tr>
<td>Tennessee River Valley</td>
<td>226</td>
</tr>
<tr>
<td>Tephigram</td>
<td>267, 342</td>
</tr>
<tr>
<td>Tethered balloon profiler</td>
<td>213</td>
</tr>
<tr>
<td>The Reynolds number</td>
<td>231</td>
</tr>
<tr>
<td>Theory of lee cyclogenesis</td>
<td>149</td>
</tr>
<tr>
<td>Thermal belt</td>
<td>104, 264</td>
</tr>
<tr>
<td>Thermal belts</td>
<td>264–266</td>
</tr>
<tr>
<td>Thermally induced winds</td>
<td>186</td>
</tr>
<tr>
<td>Thermals</td>
<td>270</td>
</tr>
<tr>
<td>Thermoneutral metabolic rate (TMR)</td>
<td>455</td>
</tr>
<tr>
<td>thermo-tidal wind theory</td>
<td>224–226</td>
</tr>
<tr>
<td>Thickness patterns</td>
<td>148</td>
</tr>
<tr>
<td>Thorowaltite’s method</td>
<td>339</td>
</tr>
<tr>
<td>Threshold velocity</td>
<td>324</td>
</tr>
<tr>
<td>Thunderstorm initiation</td>
<td>405–406</td>
</tr>
<tr>
<td>Tibet</td>
<td>378–381</td>
</tr>
<tr>
<td>Tibet, snow cover</td>
<td>413–414</td>
</tr>
<tr>
<td>Tibetan Plateau, precipitation amounts</td>
<td>413</td>
</tr>
<tr>
<td>Tien Shan</td>
<td>381–382, 383, 384–385, 477, 483</td>
</tr>
<tr>
<td>Timberlines</td>
<td>481–482</td>
</tr>
<tr>
<td>Tip jets</td>
<td>134</td>
</tr>
<tr>
<td>Topoclimates</td>
<td>14, 96</td>
</tr>
<tr>
<td>Topoclimates in Poland</td>
<td>104</td>
</tr>
<tr>
<td>Topoclimatic effects</td>
<td>101–108</td>
</tr>
<tr>
<td>Topographic amplification effect</td>
<td>199</td>
</tr>
<tr>
<td>Topographic amplification factor</td>
<td>199</td>
</tr>
<tr>
<td>Topographic indexes</td>
<td>288</td>
</tr>
<tr>
<td>Topographic traps</td>
<td>326</td>
</tr>
<tr>
<td>Topography</td>
<td>72</td>
</tr>
<tr>
<td>Topography in GCMs</td>
<td>129–131</td>
</tr>
<tr>
<td>TOPORAD</td>
<td>92–94, 105</td>
</tr>
<tr>
<td>T- or Y-shaped valley junctions</td>
<td>212–213</td>
</tr>
<tr>
<td>Trade-wind inversion</td>
<td>164, 312, 318</td>
</tr>
<tr>
<td>Tramontane</td>
<td>137</td>
</tr>
<tr>
<td>Transantarctic Mountains</td>
<td>184</td>
</tr>
<tr>
<td>Transylvanian Alps</td>
<td>80</td>
</tr>
<tr>
<td>Trapped lee wave</td>
<td>154–155</td>
</tr>
<tr>
<td>Tree deformation</td>
<td>99–100</td>
</tr>
<tr>
<td>Tretyakov gauges</td>
<td>310</td>
</tr>
<tr>
<td>Trieste</td>
<td>176</td>
</tr>
<tr>
<td>Tropical Andes</td>
<td>33, 476</td>
</tr>
<tr>
<td>Tropical Rainfall Measuring Mission (TRMM)</td>
<td>299, 371</td>
</tr>
<tr>
<td>Turbulent fluxes</td>
<td>259</td>
</tr>
<tr>
<td>Turbulent heat fluxes</td>
<td>258</td>
</tr>
<tr>
<td>Turkestan Mountains</td>
<td>106</td>
</tr>
<tr>
<td>Tyrol</td>
<td>295</td>
</tr>
<tr>
<td>Ubac</td>
<td>397</td>
</tr>
<tr>
<td>Ultraviolet radiation</td>
<td>43–47, 451</td>
</tr>
<tr>
<td>Upslope circulations</td>
<td>196</td>
</tr>
<tr>
<td>Upslope model</td>
<td>297</td>
</tr>
<tr>
<td>Upstream blocking</td>
<td>174</td>
</tr>
<tr>
<td>Utah</td>
<td>312, 318</td>
</tr>
<tr>
<td>Valais</td>
<td>286</td>
</tr>
<tr>
<td>Valdai</td>
<td>310, 313</td>
</tr>
<tr>
<td>Valley geometry</td>
<td>198, 208–209</td>
</tr>
<tr>
<td>Valley inversion</td>
<td>214–215</td>
</tr>
<tr>
<td>Valley sweeping</td>
<td>86</td>
</tr>
<tr>
<td>Valley wind</td>
<td>198</td>
</tr>
<tr>
<td>Valley-mountain wind system, theoretical basis</td>
<td>198–200</td>
</tr>
<tr>
<td>Valley–plateau circulations</td>
<td>208</td>
</tr>
<tr>
<td>Vapor pressure</td>
<td>33–34</td>
</tr>
<tr>
<td>Venezuela</td>
<td>314, 319</td>
</tr>
<tr>
<td>Ventilation</td>
<td>86</td>
</tr>
<tr>
<td>Veracruz, Mexico</td>
<td>195</td>
</tr>
<tr>
<td>Vertical eddies</td>
<td>84</td>
</tr>
<tr>
<td>Vertical lapse rate on a mountain slope</td>
<td>260–261</td>
</tr>
</tbody>
</table>

© Cambridge University Press
vertical precipitation profiles 283
vertical velocity 277
vertical velocity equation 300
vertical wind component 298
vortex shedding 166
vortex street 164, 166
Vostok 417
wake 137, 165
warm cloud 270
warm fronts 139–140
Wasatch Mountains 288
washout of cloud droplets 86
water balance 333–342
water towers of the 21st century 5
water vapor 37
wave guide 157
wave phenomena 150–168
wave trains 157
wave, vertically propagating 153
wavelength of lee waves 155
wavelength of the dominant lee waves 155
weather and human comfort 77
weather hazards 456–460
weighing lysimeter 332
Weissflujoch 254, 335
West Carpathians 104
western Colorado 289
Western Disturbances 370, 371, 374
Western Ghats 79, 277, 303
western Greenland 286
western Oregon 305
wet Andes 425–426
wet-bulb temperature 293
White Mountains 336, 447
Whiteface Mountains, New York 100
white-out 451
Willamette River Basin 290
wind 70–72
wind conditions in Colorado Rockies 406
wind data for British uplands 401
wind on mountain summits 72
windchill 448–449
winds in the Grand Canyon 215–217
windstorms 179–183, 230
windstorms in Boulder 406
Windward Islands 165
winter desiccation 98–99
winter storm precipitation across the Continental Divide 402–403
Wipp Valley 213
working capacity 446
zenith path transmissivity 36
Zugspitze 24, 61, 262, 271
Zugspitze Observatory 7, 12