

Index

- Abbe, Cleveland, 69, 72, 73, 75–76, 77
Philosophical Society of Washington,
4, 69, 71
- Adams, John, 85
- advection, 120
- aerosols, 109, 173, *See also* biogenic
volatile organic compounds
Amazon rainforest, 188
clouds, 181, 188, 191, 196
terrestrial productivity, 165, 183, 191
- albedo, 77, 78, 116, 120, 123
effect on climate, 148, 170, 173, 174
forest masking of snow, 123, 173, 175,
180, 189–190
- Franklin, 16
- Hadley circulation, 178
- mesoscale circulations, 177
- nature-based climate solutions, 202,
209, 210, 211–212
- rainfall, 197
- snow, 123, 189
- Albertus Magnus, 12
- Amazon rainforest
aerosols, 181, 188
air temperature vertical profile, 146
atmospheric teleconnections, 178
- Buffon, 17, 32
- carbon, 165, 188
- deforestation, 78, 185–189
- drought, 165, 181
- evapotranspiration, 78, 152, 185, 186,
188
- Humboldt, 22
- surface energy fluxes, 121
- tipping point, 188
- Voeikov, 45
- Williamson, 33
- wind damage, 223
- Yanomami knowledge, 229
- Anders, James Meschter, 66
- Anderson, Alexander, 36
- Arago, François, 226
- Arbor Day, 49
- Ariadne, 9
- Ascension Island, 36, 48, 69
- atmospheric boundary layer, 120, 145,
146, 177
- albedo, 172, 197
- clouds, 170, 172, 175
- evapotranspiration, 121, 124, 170, 172,
179
- surface roughness, 172
- atmospheric general circulation, 102–104
- Halley, 27
- atmospheric general circulation model,
78, 137
- Aughey, Samuel, 49
- Australia, 41, 75
- paleoclimate, 217
- wildfires, 223
- Balfour, Edward, 40
- Barbados, 27, 36
- Barton, Benjamin Smith, 21
- Baudrillart, Jacques-Joseph, 76
- Baum, L. Frank, 93
- Beatson, Alexander, 36
- Becquerel, Antoine-César, 54–56, 59, 60,
67, 139, 184
- biomass heat storage, 55
- carbon dioxide, 65
- foresteing North Africa, 196
- mesoscale circulations, 56, 177
- meteorological observatories, 56
- on narrowmindedness, 226
- roots, 55
- spatial scaling, 55
- teleconnections, 55
- US government reports, 46, 48, 71
- Berkeley, George, 83
- Bernardin de Saint-Pierre, Jacques-Henri,
18, 184
- Białowieża, 44
- bioenergy, 201, 203, 204, 208
- biogenic volatile organic compounds
(BVOCs), 114, 173, 181–183,
191
- biogeography, 106, 214–216
- biogeophysics, 78, 170–172, 181, 198,
205–206
- biomass heat storage, 55, 59, 61, 120
- biomass, definition, 131, 157
- biosphere, definition, 11
- Bjerknes, Vilhelm, 77
- Blanford, Henry, 41
- Blodget, Lorin, 60, 67, 68
- blue marble, 5, 224
- bonsai, 90, 92, 230
- boreal forests
albedo, 189–190, 192
- Bernardin de Saint-Pierre, 18, 25
- biogeography, 106, 189
- BVOCs, 191, 212
- carbon, 158, 159, 163, 191
- effect on climate, 148, 174, 175, 176,
181, 184, 190, 191, 202, 205
- evapotranspiration, 152, 191
- forest succession, 192, 221
- glacial cycles, 190
- nature-based climate solutions, 202,
206, 209, 211–212, 213
- surface energy fluxes, 121, 122
- tipping point, 193
- wildfire, 192–193
- Boussingault, Jean-Baptiste, 23, 34, 41,
45, 55, 64
- Boyle, Robert, 14
- Brandis, Dietrich, 41
- Bretherton, Francis, 80
- Brocéliande, 227
- Brown, Horace Tabberer, 78
- Brown, John Croumbie, 43–44, 61
- Brückner, Eduard, 9, 74
- Bruegel, Pieter, the Elder, 95–96
- Buffon, Georges-Louis Leclerc, 17, 32,
184, 188, 196
- Butter, Donald, 40
- Canada, 14, 17, 20
- carbon accounting, 208
- carbon cycle, 110, 157–161
anthropogenic emissions, 110, 112, 161

- atmospheric measurements, 110, 159
- Boussingault, 64
- climate feedback, 164–165, 172, 180
- CO₂ fertilization, 163–164
- Ébelmen, 65
- preindustrial, 161
- terrestrial carbon sink, 163–165
- cedar of Lebanon, 75, 95
- Cézanne, Ernest, 57
- Charney, Jule, 197
- Chekhov, Anton, 45
- China
 - afforestation, 179, 196
 - historical deforestation, 85
- Chrétien de Troyes, 93
- Church, Frederic Edwin, 86, 89, 215
- Clarke, William Branwhite, 41
- Clavé, Jules, 47, 57, 65, 83, 184
- Clayton, John, 27
- Cleghorn, Hugh, 40
- climate change
 - continental drift, 109
 - glacial cycles, 108
 - greenhouse gases, 110–112
 - solar radiation, 109
 - thermohaline circulation, 109
- climate model, 78, 111, 136–138, 168, 170, 177, 183, 187
- deforestation, 174, 185, 186, 190, 194
- desert world, 169
- dryland degradation, 198
- grassland world, 173–174
- climate service index, 181, 205–206
- climate zones, 103–104, 105–106
- climate-smart forestry, 207–210
- rotation cycle, 208, 209, 211–212
- cloud forest, 151
- Cole, Thomas, 85, 88
- Columbus, Christopher, 26, 27, 33
- conduction, 116
- convection, 116
- Cooper, Ellwood, 48
- Cotta, Heinrich, 57
- Coweeta Hydrologic Laboratory, 154
- Cowthorpe oak, 86
- Curtis, George, 71
- Curtis, John, 77
- Dalzell, Nicol, 40
- Darwin, Charles, 91
- Denes, Agnes, 90
- Denys, Nicolas, 14
- Disney, Walt, 91
- Douglas, William O., 95
- Dove, Heinrich, 58, 188
- Drori, Jonathan, 92
- Dubos, Jean-Baptiste, 16
- Duhamel du Monceau, Henri-Louis, 14, 85
- Dunbar, James, 16
- Dunbar, William, 20
- Dust Bowl, 179
- Dwight, Timothy, 18, 21, 34
- Earth system model, 80, 111, 136, 137, 168
- Earth system science, 6, 8, 80, 225
- Lamarck, 54
- Ébelmen, Jacques-Joseph, 64
- Ebermayer, Ernst, 59–60, 61, 63, 67, 139, 145
 - mesoscale circulations, 177
 - oxygen, 65
 - roots, 59
 - US government reports, 47, 48, 71
 - water vapor, 65
- ecosystem, definition, 11
- eddy covariance, 56, 128–131
 - evapotranspiration, 152, 155–156
 - forest air temperature, 148, 176
 - surface fluxes, 121, 179
 - surface temperature, 176, 194
- El Hierro, rainmaking tree, 26, 36
- El Niño, 108, 223
- Elliott, Richard, 49
- emerald planet, 6, 224
- Emerson, Ralph Waldo, 65
- energy balance
 - forest, 120–126
 - land surface, 114–117
 - leaf, 117–120
 - planetary, 101–102
- eucalyptus, 41, 48
- Europe
 - forest evapotranspiration, 155, 156, 179
 - forest influences on climate, 194, 210, 211
 - forest microclimate, 145
 - heatwaves, 179
 - paleovegetation, 220
- evaporation, 16, 27, 105, 116, 117, 151.
 - See also* evapotranspiration
- Aughey, 49
- Boussingault, 35
- Brown, 43
- Clavé, 57
- Curtis, 72
- Ebermayer, 59
- Harrington, 71
- Humboldt, 34
- leaf area, 124, 152, 172, 180, 195
- Lorenz, 61
- Mathieu, 56
- Richardson, 77
- Sargent, 72
- Williams, 34
- Zon, 74
- evapotranspiration, 27, 105, 120, 124, 151, 152, 172, 175, 205
 - atmospheric boundary layer, 121, 125, 170, 175
 - biogeography, 214
 - deforestation, 154, 170, 173, 185, 188
 - drought, 50, 155, 179, 198, 199, 210
 - eddy covariance, 130, 152, 155–156
 - effect on climate, 78, 169, 170, 172, 173, 174, 194
 - forest, 152, 154, 155–156, 186, 191
 - Gannett, 149
 - Harrington, 71
 - heatwaves, 179, 210
 - Hubbard Brook, 134, 154
 - lysimeter, 156
 - mesoscale circulations, 177
 - Moreau de Jonnès, 53, 184
 - mountain pine beetle, 195
 - precipitation recycling, 185
 - remote sensing, 136
 - roots, 152, 155, 172, 173, 179, 186, 210
 - surface temperature, 148, 194, 196, 206, 210
 - Voelkov, 45
 - water balance, 133, 151
 - Zon, 73
- Evelyn, John, 27, 29, 31, 82, 84, 87, 92, 118, 229
- Fabre, Jean-Antoine, 34, 44
- fairy tales, 92, 93
- Fernández de Oviedo y Valdés, Gonzalo, 26
- Fernow, Bernhard, 70, 73, 76
 - Forest Influences, 70–72, 76
 - Philosophical Society of Washington, 3
- Ferrel cell, 103

310 Index

- Ferrel, William, 69, 169
 Finland
 climate change, 212
 forest influences on climate, 191, 211–212
 Tree Mountain, 90
 forest hydrology, 34, 36, 44, 52, 61, 66, 72
 forest meteorology, 25, 52, 54, 59, 61, 62, 64, 66, 67, 71, 76
 forest microclimate
 air temperature, 143–146, 148
 Harrington, 71
 Mathieu, 56
 nature-based climate solutions, 145, 209
 solar radiation, 142–143
 Webster, 20
 wind speed, 143
 forest shade, as cause of cold, 12, 14, 16, 17, 21, 54
 forest succession, 208, 221–222
 Thoreau, 92
 forest, definition
 Le Roy, 84
 medieval kings, 84
 Schlich, 85
 United Nations, 83
 forest-climate question
 historical interpretation, 7–8, 51, 226, 227
 forests, as public utility, 9, 81, 85, 227–228
 Forry, Samuel, 24, 67
 Fortey, Richard, 92
 Fraas, Carl, 57
 Franklin, Benjamin, 16, 31, 166
 Fredville oak, 87
 free-air CO₂ enrichment experiments, 132, 164
 Furuzawa, Juzaburo, 230

 Gannett, Henry, 4, 68, 70, 71, 149
 Geiger, Rudolf, 76, 139, 144, 145, 168
 Gibson, Alexander, 40
 Gilboa, New York, 216
 Gilgamesh, 95
 Gilpin, William, 90, 92
 glacial cycles, 108
 forest feedback, 190
 paleovegetation, 218–221
 Greeley, Horace, 48
 Greendale oak, 87

 greenhouse effect, 102
 Anders, 66
 Ebermayer, 66
 Tyndall, 65
 water vapor, 65, 66, 175, 191
 Gregg, Josiah, 45
 Grew, Nehemiah, 27
 gross primary production, 157, 158, 159
 water-use efficiency, 166
 groundwater, 151

 Hadley circulation, 102, 178, 179
 Haeckel, Ernst, 11
 Haiti, 27
 Hale, Thomas, 229
 Hales, Stephen, 29, 31, 32, 33, 132, 166
 Halley, Edmond, 27, 29, 150
 Hann, Julius, 41, 60, 74, 177, 226
 Harrington, Mark, 52, 70–71
 Harrison, Robert Pogue, 82, 94, 228
 Haskell, David George, 92
 Hayden, Ferdinand, 47, 49
 heat capacity, 104, 125
 Henry, Joseph, 46, 49
 Herder, Johann Gottfried, 15
 Herschel, John, 39
 Hey, Rebecca, 94
 Heywood, John, 97, 98
 Hibberd, Shirley, 65
 Hitchcock, Phineas, 47
 Hohenstein, Adolph, 60, 65
 Holyoke, Edward, 18, 19, 31
Homo sapiens, evolution, 82
 Hough, Franklin, 47–48, 60, 76
 Hubbard Brook Experimental Forest, 131, 134, 154
 Humboldt, Alexander von, 21–23, 27, 45, 54, 184
 Cosmos, 23, 88, 228
 Heart of the Andes, 89
 isotherms, 21, 22
 Lake Valencia, 34
 macroclimate, 22
 rainfall, 33
 Russia, 22, 44
 Tableau physique, 215
 transpiration, 21, 22, 29, 33
 tropical rainforests, 22, 188
 Views of Nature, 23, 25, 32, 92, 196, 228
 Hume, David, 16
 hydrologic cycle, 105, 150–152
 Halley, 150

 ice cores, 108, 110
 India, 40–41, 45
 infiltration, 54, 55, 74, 151, 155
 Clavé, 57
 insect infestations, 158, 165, 193, 194, 195, 212, 222, 223. *See also* mountain pine beetle
 interception, 71, 74, 149, 150, 152, 154, 172, 180, 186, 195
 Clavé, 57
 Ebermayer, 59
 Fabre, 34
 Lorenz, 61
 Mathieu, 56
 interdisciplinary science, need for, 8, 225–227
 intertropical convergence zone, 103, 104, 105, 178
 Irving, Washington, 93
 isoprene. *See* biogenic volatile organic compounds
 Israel, pine forests, 199

 Jamaica, 26, 27, 29
 Jefferson, Thomas, 20, 54
 climate of Virginia, 17
 climate survey, 20
 criticism of, 19, 24
 mesoscale circulations, 18, 177
 respect for trees, 20
 response to Buffon, 17
 Jesuit, French missionaries, 14

 Kalm, Pehr, 13, 14
 Kerner von Marilaun, Anton, 226
 Kittredge, Joseph, 77
 Kopenawa, Davi, 229
 Kotok, Edward, 76

 La Niña, 108
 Lake Valencia, 21, 34
 Lamarck, Jean-Baptiste, 54, 226
 land use, 201, 205
 carbon flux, 160, 161, 163
 future scenarios, 203–205
 historical deforestation, 203
 landscape heterogeneity
 rainfall, 59, 62, 178
 latent heat flux, 116. *See also* evapotranspiration

- atmospheric boundary layer, 125, 172, 177
 forest canopy, 120, 121, 122
 leaf, 119
 latent heat of fusion, 116
 Le Roy, Charles-Georges, 84
 leaf area index, 124, 141
 forest microclimate, 145
 solar radiation, 142, 189
 leaves, 139–142
 biosphere greening, 180
 energy balance, 117–120
 size and orientation, 18, 118, 119, 139, 142
 temperature, 16, 19, 77, 119
 Leonardi, Cesare, 90
 Lescarbot, Marc, 14
 Leslie, John, 21
 Liebig, Julius, 58
 Lin, Maya, 90
 Little Ice Age, 109, 110
 Liu Chi, 94
 Long, Edward, 29
 Longfellow, Henry Wadsworth, 94
 longwave radiation, 101, 114, 115, 116
 forest canopy, 122, 125, 143, 145, 146
 greenhouse effect, 65, 102
 Humboldt, 23
 planetary energy balance, 101
 surface temperature, 118, 125, 176
 water vapor, 65, 170, 172, 191, 198
 Lorenz von Liburnau, Josef Roman, 61–62, 63, 64, 67, 71
 mesoscale circulations, 62, 177
 Lorenz, Edward, 78
 Loudon, John, 89, 92
 Lovell, Joseph, 24
 Lowell, Percival, 75
 Lyell, Charles, 20, 24, 67
 lysimeter, 156
 Ma Yuan, 87, 225
 macroclimate, 101, 105
 Becquerel, 55
 Ferry, 24
 Humboldt, 22
 Lorenz, 61
 Moreau de Jonnés, 53
 Magna Carta, 84
 Maitland, Sara, 92
 Malpighi, Marcello, 27
 Malte-Brun, Conrad, 20, 24
 Marié-Davy, Hippolyte, 57
 Mars, 75
 Marsh, George Perkins, 46, 53, 77, 85, 196
 Mather, Cotton, 14
 Mathieu, Auguste, 56, 57, 59, 71, 139, 168
 Mauna Loa Observatory, 110, 127
 Maunder Minimum, 109
 Mauritius, 35, 48
 medieval romance, 93, 227
 Medieval Warm Period, 109
 mesoclimate, 101
 mesoscale circulations, 177, 186
 Becquerel, 56
 Berger, 58
 Ebermayer, 59
 Hann, 60
 Jefferson, 18
 Lorenz, 62
 Purkyně, 64
 Williamson, 16
 meteorological observatories, 60
 Becquerel, 56
 Ebermayer, 59
 Ferry, 70
 Lorenz, 62
 Mathieu, 56
 methane, 102, 110, 111, 173, 181, 182, 183, 192
 Michaux, François André, 89, 92
 microclimate, 101, *See also* forest microclimate
 Milankovitch cycle, 109
 Milne, A. A., 94
 Mirbel, Charles-François Brisseau de, 53
 Mitchell, John, 15
 Monet, Claude, 88
 monoterpenes. *See* biogenic volatile organic compounds
 monsoon, 40, 104, 178, 199
 Moore, Willis, 72–73
 More, Thomas, 96–97, 98
 Moreau de Jonnés, Alexandre, 53–54, 184
 mountain pine beetle, 165, 195–196, 222
 Mueller, Ferdinand von, 41
 Muir, John, 95
 Munns, Edward, 76
 Nancy, France, 56, 76
 natural climate solutions. *See* nature-based climate solutions
 natural laws, 9, 228–229
 nature-based climate solutions, 5, 8, 157, 163, 167, 201–203, 224, *See also* climate-smart forestry
 albedo, 202, 209, 211–212
 biogeophysical influences, 205–206
 European forests, 211
 Finnish forests, 211–212
 forest microclimate, 145, 209
 net biome production, 158
 net ecosystem production, 158, 159
 net primary production, 157, 158
 New Zealand, 13, 42–43, 75
 Nisbet, John, 40
 nitrogen deposition, 165
 nitrous oxide, 102, 110, 111, 173
 ocean general circulation, 104–105
 Orpheus, 93
 Ovid, 93
 oxygen
 biogeochemical cycle, 65, 166–167
 forest benefit, 31, 57, 64, 65, 71, 166–167
 phlogiston theory, 18, 31
 ozone, 165, 173, 181, 182, 183, 192, 206, 223
 paleoforests, 216–221
 migration rate, 219
 Pangaea, 109
 Pelloutier, Simon, 16
 permafrost, 161, 165
 Philosophical Society of Washington, 3–4, 69, 70, 71
 phlogiston, 18, 31
 photosynthesis, 164, *See also* gross primary production
 CO₂ fertilization, 163, 180
 diffuse radiation, 142, 165, 183, 191
 leaf chamber, 128
 ozone, 165
 Pigafetta, Antonio, 27
 Pinchot, Gifford, 76
 Piper, Richard Upton, 45
 Pliny the Elder, 12, 33
 Poivre, Pierre, 35
 polar forests, 217

312 Index

- pollen core
 Anderson Pond, Tennessee, 218
 Laguna de la Roya, Spain, 220
 Powers, Richard, 92
 Priestley, Joseph, 31
 proverbs
 cannot see the wood for trees, 96–97
 Purkyně, Emanuel, 62–64, 65
- radiative forcing, 112, 172, 205
 aerosols, 182
 albedo, 205
 biogeochemical, 173
 BVOCs, 182, 183
 shared socioeconomic pathways, 112
 terrestrial carbon storage, 172, 205
 wildfire, 192
- rain follows the plow, 49–51
 rain gauge, 43, 60, 69, 71, 73, 133
 Ramsay, David, 20
 Rauch, François-Antoine, 35–36, 53, 230
 Reagan, Ronald, 227
 remote sensing, 134–136, 176
 Renou, Émilien, 57
 respiration
 autotrophic, 157
 Boussingault, 64
 Ébelmen, 65
 ecosystem, 159
 heterotrophic, 157, 166
 phlogiston theory, 31
 Priestley, 31
 Ribbentrop, Berthold, 40
 Richardson, Lewis, 77–78
 Ridgway, Robert, on Wabash valley, 97
 Robertson, William, 16
 Robin Hood, 83
 roughness, 78, 123, 172, 205
 effect on climate, 174, 175
 Israeli pine forest, 199
 leaf area, 124, 210
 mesoscale circulations, 186
 Sahel land degradation, 198
 surface temperature, 126, 148, 176, 195, 206
 Royal Academy of Brussels, 53, 64
 royal forest, 84
 Royal Meteorological Society, 41
 runoff, 74, 105, 109, 133, 151, 152, 155, 180, 196, 210, *See also* streamflow
 Clavé, 57
 Moore, 73
- Rush, Benjamin, 31
 Russia, 22, 44–45, 75
- Sahara desert, 199
 Becquerel, 55
 Buffon, 17, 32
 Humboldt, 23, 33
 Marsh, 46
 Wilber, 50
 Sahel, 196, 197–199
 Santo Domingo, 26
 sap flow, 131
 Hales, 29
 Sargent, Charles Sprague, 72
 Schacht, Hermann, 65
 Schleiden, Matthias, 58
 Schlich, William, 40, 85, 98
 Schöpf, Johann, 15
 Scotland, meteorological society, 39
 Scott, Robert, 41
 sensible heat flux, 116
 atmospheric boundary layer, 125, 179
 eddy covariance, 130
 forest canopy, 120, 121, 122, 155
 Israeli pine forest, 199
 leaf, 119
 mesoscale circulations, 177, 186
 surface temperature, 194, 210
 Shakespeare, 94
 shared socioeconomic pathways, 111–112, 205
 land use, 203–205
 Simard, Suzanne, 92
 Smoky Mountains, Tennessee, 215, 221
 snowmelt, 195
 Denys, 14
 Dwight, 21
 Franklin, 16
 Pierre Biard, 14
 Vitruvius, 12
 soil carbon, 157, 161, 165
 soil moisture, 152
 evapotranspiration, 124, 172, 179
 solar radiation. *See also* aerosols
 annual cycle, 121
 clouds, 175, 198
 diffuse, 115, 142, 172, 183, 191
 direct beam, 114, 142
 diurnal cycle, 122
 forest canopy, 124, 142–143, 145
 leaf inclination, 119, 142
- Milankovitch cycles, 109, 190, 199, 218
 near-infrared waveband, 119, 123
 planetary energy balance, 101
 reflectance, 116, *See also* albedo
 snowmelt, 195, 196
 sunspots, 109
 visible waveband, 118, 123
- South Africa, 43–44
 St. Croix, 48
 St. Helena, 36, 48, 69
 St. Vincent, 36
 Stafford, Fiona, 92
 Stagi, Franca, 90
 Stegner, Wallace, 92
 stomata, 119, 124, 152, 179
 CO₂ fertilization, 180
 Grew, 27
 Malpighi, 27
 Richardson, 77
 water-use efficiency, 164, 165
 Woodward, 27
 streamflow, 152, *See also* runoff
 Boussingault, 34
 Butter, 40
 Chekhov, 45
 deforestation, 33–35, 153–155
 Dwight, 34
 Fabre, 34
 Gannett, 4, 149
 Hohenstein, 60
 Hubbard Brook, 134, 154
 Humboldt, 34
 Mirbel, 53
 Moore, 73
 Moreau de Jonnés, 53
 mountain pine beetle, 195
 Pliny the Elder, 12
 Poivre, 35
 Purkyně, 64
 Rauch, 35
 Sargent, 72
 Surell, 34
 Volney, 33
 Webster, 34
 Wex, 61
 Williams, 33
 Wilson, 149
 Zon, 73
 Strutt, Jacob, 87
 Stubbe, Henry, 27
 Suess, Eduard, 11

sunspots, 109
Surell, Alexandre, 34, 44, 57
surface temperature, 123, 176–177, 186, 196, 206, 210
 biogeophysical mechanisms, 148, 176, 194
 drought, 179
 forest canopy, 125
Symons, George, 41

teleconnections, 177, 178, 180
 Becquerel, 55
temperate forests
 biogeography, 106, 193
 carbon, 158, 159, 163
 effect on climate, 174, 175, 176, 178, 181, 184, 194
 evapotranspiration, 152
 nature-based climate solutions, 206
 surface energy fluxes, 121
 teleconnections, 179
Theophrastus, 12
thermal conductivity, 116, 125
thermohaline circulation, 104, 109
Thoreau, Henry David, 92–93, 95
Thornthwaite, Charles, 77
throughfall exclusion experiment, 132
tipping point, 188, 193, 197
 Balfour, 40
 Dove, 58
Tobago, 36
transpiration, 27, 180, 195, *See also*
 water-use efficiency
 Anders, 66
 Brown, 44
 Clavé, 57
 cohesion-tension theory, 29, 131
 Ebermayer, 59
 Hales, 29
 Halley, 27
 Humboldt, 21, 22, 29
 leaf chamber, 128
 leaf flux, 119
 Lorenz, 61
 Mathieu, 56
 Rauch, 35

Richardson, 78
Robertson, 16
Williamson, 33
Woodward, 27
Zon, 74
Travers, William, 42
Tristan, 93
tropical forests. *See also* Amazon
 rainforest
 air temperature, 148
 biogeography, 106
 carbon, 158, 159, 163
 effect on climate, 174, 175, 176, 179, 181, 184, 205
 nature-based climate solutions, 202, 206, 209
turbulent mixing, 77, 119, 121, 129, 174, 176, 200, 205, *See also* roughness
Tyndall, John, 65, 66

United States
 agricultural intensification, 194
 attitude to forests, 85, 88
 climate change, 14–15, 16, 18–21
 forest influences on climate, 194
 Forest Service, 47, 70, 73, 76, 153
 foresting the prairie, 46–48, 68
 National Academy of Sciences, 72
 nature-based climate solutions, 202, 203
 streamflow, 33–34
 Timber Culture Act 1873, 47, 68
 Weather Bureau, 4, 69, 70, 72, 153
 wildfire, 196

van Gogh, Vincent, 88
Vernadsky, Vladimir, 11
Virgil, 229
Vitruvius, 12, 33
Voeikov, Alexander, 40, 45
Vogel, Julius, 42
volcanoes, 109, 111
Volney, Constantin-François, 20, 24, 29, 33, 34

watershed, 73, 132–134
 Coweeta Hydrologic Laboratory, 154

deforestation, 153–155
 Hubbard Brook Experimental Forest, 134, 154
 species conversion, 210
 Wagon Wheel Gap, 75, 153
water-use efficiency, 124, 154, 164, 165, 166, 179, 209, 210
Webster, Noah, 19–20, 34
Weld, Isaac, 13
Wex, Gustav, 61, 72
Whitbourne, Richard, 14
White, Gilbert, 34
Wilber, Charles, 50
wildfire, 223
 aerosols, 173, 188, 192, 196, 223
 albedo, 189, 192
 Amazonian tipping point, 188
 carbon flux, 158, 165
 forest succession, 192, 221
 forest threat, 194, 196, 212, 222
 radiative forcing, 181, 192, 206
Willershausen, Germany, 217
Williams, Michael, 82
Williams, Samuel, 18–19, 20, 54
 criticism of, 19, 24
 oxygen, 31
 rainfall, 29
 streamflow, 33
Williamson, Hugh, 14, 15, 16, 17, 18, 184, 188
 mesoscale circulations, 177
 rainfall, 29, 33
Wilson, Herbert, 149
Wilson, John Fox, 43
Wilson, Joseph, 47
Wohlleben, Peter, 92
Wonderful Wizard of Oz, 91, 93
wood products, 161, 207, 208, 211, 212
Woodward, John, 27

Younger Dryas, 109, 221

Zipes, Jack, 93
Zon, Raphael, 73–74
Zötl, Gottlieb von, 60