

# Subject Index

## A

- Air pressure 61, 69, 102, 183, 197 - 199, 202, 205, 206, 222, 224, 242, 277, 278, 286, 287, 289, 321, 322, 330
- Albedo 230, 242, 254
- Amphidrome 123, 124, 134, 136, 138, 146
- Amplitude factor: see gravimetric, diminishing, tilt factor
- Anelasticity 28, 29, 79, 101
- Angular momentum 179, 186, 188
  - atmosphere 185, 188, 189, 204, 243,
  - earth 96, 98, 99, 174, 185, 243, 247, 253
  - galaxies 381, 382
  - oceans 173, 185
  - orbital 178
  - tidal 124, 247
- Annual wobble 184, 189, 191 - 194, 202, 209, 210
- Anti-node 123
- Aquifer 85, 277, 280 - 288, 331
- Astronomical arguments 18, 19, 175
- Atmosphere
  - latent heat 222, 228, 231
  - superrotation 233, 243, 244
- Atmospheric
  - excitation 185, 198 - 203, 205
  - pressure: see air pressure
  - tide 79, 221, 231, 233, 261, 343
  - lunar 222, 225, 226, 233, 243
  - resonance amplification 243
  - solar 79, 221 - 246

## B

- Barometric
  - effects 277, 278, 279, 289
  - efficiency 286

- pressure: see air pressure
- Body tide 79, 81, 86, 145, 157, 161, 188
- Boreholes 47, 78, 86, 87, 88, 162, 277, 321, 330
- Boundary-value problem 27, 42, 43, 147

## C

- Callisto 346 - 348
- Cavity effect 29, 47, 79, 86, 87, 162
- Chandler wobble 98, 101, 175, 183 - 215
- Circulation 254, 256, 257, 259
- Climate 200, 201, 205, 248, 254, 255, 256, 257, 258, 259
- Compound tides 113, 135, 136
- Confined aquifer 277, 280, 283, 284, 285
- Core-mantle boundary (CMB) 96 - 98, 100, 105, 106, 350, 357
- Core-mantle coupling 96, 97, 176
- Core resonance, see NDFW 95 - 106
- Crustal structure 85, 145, 155, 158, 161, 162, 327
- Cryogenic gravimeter 72, 78, 82, 102, 104, 105

## D

- Dansgaard-Oeschger event 256
- Darcy conductivity 281, 287
- Darwin symbol 79
- Deformation-induced (tidal) potential 31, 41 - 44
- Dilatancy 86, 313 - 317, 334 - 336
- Diminishing factor, see tilt factor
- Doodson constant 233

## E

- Earthquake 86, 89, 185, 188, 293 - 295,  
297 - 302, 305, 311, 314, 317,  
319, 320, 337  
— catalog 297, 299, 300  
Eccentricity 177, 179, 245, 247, 248  
- 250, 252, 255, 256, 258, 351,  
352, 360, 361, 365, 366, 369, 372  
Eddy viscosity 115, 124, 126, 178  
Effective stress 280, 281, 311, 314, 330,  
332 - 337  
Effect of rotation and ellipticity 28, 29,  
42, 47, 50-52, 82  
Ellipticity 28, 48, 49, 97, 98, 105, 106  
Energy 116, 122, 124, 126, 127, 129,  
131, 139  
— budget 113, 124, 129, 130, 139  
— decay time 118, 128  
— dissipation 120, 124, 126, 127, 130,  
131, 197, 234, 355, 356, 364 -  
370, 374  
— internal 233  
— rotational 178  
— transport 118, 120, 122, 126  
Ephemerides 9, 18  
Equations of motion 27, 28, 29, 34, 36,  
37, 41, 43, 45, 52, 54, 178  
Equatorial electrojet 265, 266  
Equilibrium tide 27, 117, 119, 127 -  
130, 197, 231, 232  
Euler equation 96, 197  
Eulerian (space-fixed) description 27,  
31, 35 - 44, 54  
Europa 346 - 348, 360, 361, 368  
Excitation functions 175, 187, 188,  
189, 201, 204

## F

- Fault 87, 89, 295, 300 - 302, 318 - 320,  
330 - 332, 334, 336

- Ferrel cell 228  
Finite element models 29, 54, 164, 313  
Flattening effect 10, 16, 17, 82, 101  
Focal mechanism 295, 300  
Foraminifera 254, 257  
Fracture 87, 277, 288, 289, 316, 318,  
336  
Free oscillations  
— Earth 101, 105, 163  
— Oceans 113, 114, 118, 121, 123, 128  
— hemispherical 117 - 119  
Friction 133, 300, 318, 319, 333, 381  
— bottom 115, 124, 126, 137, 139, 175,  
178  
— linear 116  
— tidal 175, 176, 178, 179

## G

- Ganymede 346 - 348, 360, 361  
General relativity 85, 177, 379  
Geoelectric tides 272, 273  
Geologic effect 311, 312, 327, 336  
Geomagnetic  
— tides 261 - 263, 268, 272  
— variation 261, 262, 266, 271, 272  
Geopotential 234, 235, 241, 244  
Gerstenkorn event 179  
Global positioning system (GPS) 78,  
159, 174, 175  
Gravimeter 12, 46, 62, 68, 69, 71, 72,  
78, 82, 83  
Gravimetric factor 28, 29, 47, 51, 53,  
79, 82, 83, 100, 102, 103, 146,  
147, 160  
Green's function 115, 122, 146, 147,  
149 - 152, 154 - 158, 160, 161,  
163, 164, 168 - 171  
Greenhouse  
— effect 231, 241  
— gas 258  
Growth rhythms 178

## H

- Hadley cell 228  
 Harmonic constants 114, 136, 137  
 Harmonic oscillator 100, 194  
 Heat flow  
 — Earth 80, 84, 85  
 — Io 347, 348, 350, 356, 361 - 366, 369  
 Heinrich event 256  
 Herpolhode 99  
 Hooke's law 37, 354  
 Hooke's generalized law for poroelastic media 281, 314  
 Hough function 234, 236, 237, 239, 241, 244, 245  
 Hydraulic conductivity 281, 287  
 Hydraulic diffusivity 280, 283, 288, 332, 333  
 Hydrodynamic  
 — models 113, 114, 158, 159, 197  
 — tide modeling 115, 117, 119, 127, 173  
 Hydrostatic  
 — equilibrium 27, 29, 54, 352  
 — flattening 48  
 Hysteresis of stress-strain curve 317, 318

## I

- Ice 346  
 — age 247, 248, 257  
 — shelves 84, 161, 294  
 Inclusion 313, 314, 317, 318  
 Inertial coupling 97  
 Inertia tensor 96, 173, 186, 188  
 Insolation 205, 222, 250, 252, 254 - 258  
 Instantaneous rotation axis 98, 99, 183  
 Internal structure  
 — Earth 28, 82  
 — Io 349 - 351, 354, 356 - 360, 362, 368, 369  
 Invariable plane 99, 254, 256  
 Io 345 ff.  
 — core 348, 349, 356, 360 - 363, 369

- eccentricity of orbit 351, 352, 359, 361, 364, 366, 369 - 374  
 — magnetic field 348, 362, 363, 375, 376  
 — mantle 350, 354, 356, 357, 360 - 365, 367 - 370  
 — mean motion 352, 360, 364, 369 - 372  
 — tides 305, 350 - 359  
 — thermal evolution 359 - 370  
 — orbital evolution 359 - 370  
 Ionospheric dynamo 261 - 263, 265, 266, 268 - 272  
 Irradiance 247, 248, 249, 252, 257  
 Isotherms 139, 140, 141

## J

- Jupiter 11, 19, 20, 305, 346, 348, 351 - 353, 359 - 361, 368, 372

## K

- $K_1$ -tide 22, 69, 85, 102, 128, 129 - 133, 136, 137, 157, 173 - 175, 251, 278, 304  
 $K_2$ -tide 22, 85, 136, 157, 251

## L

- Lagrangian description 31, 32, 36, 37, 39, 41, 42, 54  
 Lamb parameter 235  
 Lamé constants, - parameters 37, 48, 53, 147, 148, 154, 295  
 Laplace's tidal equation 235  
 Lateral heterogeneity 28, 29, 47, 49, 53, 54, 84, 85  
 Lateral inhomogeneity: see lateral heterogeneity, geologic effect  
 Latitude dependence 12, 14, 28, 51, 52, 82 - 85, 295

Least squares 59, 60, 62, 67, 123, 174, 204, 325  
 Legendre polynomial 13, 14, 15, 48, 115, 151, 223, 249  
 Length-of-day (LOD) 53, 102, 173, 174, 176, 187, 188, 243  
 Liouville equations 96, 174, 187  
 Loading and self-attraction 116 - 120, 122, 124, 127  
 Loading efficiency 284  
 Local elastic effect 79, 81, 100  
 Local inhomogeneity 29, 54  
 Love numbers  
 — Earth 28, 29, 45, 46, 47, 49, 50, 51, 53, 79, 98, 100, 102, 115, 117, 146, 148, 150, 151, 154, 157, 174, 178, 197  
 — Io 249, 255, 256, 259, 260  
 — load 116, 146, 147, 149, 150, 151, 157, 165  
 Lower atmosphere 228, 229, 231, 244  
 Lunar laser ranging (LLR) 77, 176, 177, 206  
 Lunar variation 262, 263, 266  
 Luni-solar variation 265  
 L-variation 262  
 L<sub>2</sub>-tide 22, 66, 118, 120

## M

Mars 11, 19, 180, 346  
 Mass conservation 122, 149, 155, 197  
 Matrix compressibility 280, 314  
 Mercury 11, 19, 176, 177, 345, 363  
 M<sub>f</sub>-tide 22, 71, 128, 145, 173, 174, 294, 298, 299  
 Middle atmosphere 226, 229, 233, 239  
 — jetstream 226, 229  
 Milankovic hypothesis 247, 254, 256, 257  
 M<sub>m</sub>-tide 22, 71, 128, 145, 173, 174  
 M<sub>2</sub>-tide 22, 66, 69, 71, 79, 80, 83 - 85, 123, 126 - 132, 134, 136 - 140, 157 - 163, 173 - 175, 178, 222, 225, 242, 265, 266, 277, 278, 294,

298, 299, 304, 321 - 324, 328 - 330, 333  
 M<sub>3</sub>-tide 22, 69, 71  
 M<sub>4</sub>-tide 69, 71, 136, 137, 141

## N

Nearly-diurnal free wobble (NDFW) 49, 77, 95 - 106  
 Neptun 11, 346  
 Newtonian cooling 234, 235  
 Nonhydrostatic structure 101  
 Nonlinearities 87, 113, 116, 136, 137, 163, 184, 186, 193, 194, 195, 233, 254, 255, 319  
 Nutation 184, 247  
 — forced 49, 53, 102, 247  
 — free core (FCN) 28, 49, 69, 95 - 106, 175  
 — free inner core (FICN) 101  
 N<sub>2</sub>-tide 22, 66, 69, 71, 129, 136, 157, 173, 179

## O

Obliquity 177, 247, 250, 252, 253  
 Occultations of stars 177  
 Ocean  
 — tide 10, 27, 79, 83, 85, 113 - 141, 144 - 148, 155, 157 - 161, 163, 165, 166, 173, 174, 188, 226, 272, 273, 293, 294, 298, 343  
 — attraction 145 - 165  
 — loading 79, 81, 82, 85, 87, 105, 122, 145 - 165, 295, 300, 301, 323, 324, 336, 343  
 Overtides 113, 135 - 137  
 Oxygen-18 254 - 258  
 Ozone layer 230  
 O<sub>1</sub>-tide 22, 69, 71, 84, 85, 100, 102, 123, 125, 128, 129, 136, 137, 157 - 162, 173 - 175, 222, 225, 277, 278, 304, 321, 323, 324, 330

## P

- Permeability 281, 282, 283, 288, 289  
 Piola-Kirchhoff pseudo stress tensor  
   33, 34  
 Pluto 11, 346  
 Poinsot representation 98, 99  
 Poisson  
 — equation 30, 36, 148, 353, 354, 383  
 — ratio 280, 281, 313, 314  
 Polar motion 53, 174, 175, 183 - 215,  
   245  
 Pole tide 61, 71, 72, 183, 191, 196 - 198  
 Polhode 99  
 Poroelasticity 277, 278, 280, 283, 288,  
   289  
 Porosity 278, 280, 288  
 Precession 184, 247, 248, 252 - 254, 260  
 Precipitation 256  
 Preliminary reference earth model  
   (PREM) 46, 48, 52, 85, 150, 151,  
   154, 156, 164  
 Pressure 122  
 — barometric: see air pressure  
 — confining 278, 280, 281, 282, 315  
   - 317, 319  
 — diffusion of 281, 287, 327, 332  
 — effective: see effective stress  
 — pore fluid 278, 279, 280 - 282, 284,  
   286 - 289, 311, 314 - 318, 325,  
   330, 333  
 Prograde motion 189, 194  
 $P_1$ -tide 22, 69, 71, 102, 129, 157, 173,  
   251, 304  
 $\phi_1$ -tide 69, 71, 251  
 $\psi_1$ -tide 69, 71, 102, 105, 251

## Q

- Quality factor (Q) 29, 85, 95, 102, 104  
 - 106, 129, 163, 183, 189, 191,  
 194, 195, 203, 355, 356

## R

- Radiation 248, 250 - 252, 255  
 — balance 230  
 — condition 241, 239  
 Rayleigh  
 — criterion 65  
 — friction 232, 234, 235  
 — number 361, 372  
 Resonance 96 - 105, 115, 118, 125, 127,  
   128, 130, 145, 146, 179, 183,  
   193, 194, 196, 242, 345, 346,  
   360, 367 - 369, 379  
 Retrograde motion 98, 189, 194  
 Rheology 277, 278, 345, 353 - 355, 361,  
   365, 370

## S

- Satellite altimetry 122, 157, 158, 160,  
   161, 163  
 Satellite laser ranging (SLR) 78, 158,  
   174, 175, 206, 207  
 Saturn 11, 19  
 Scale height 232, 234  
 Schuster test 294, 296 - 298, 300, 302 -  
   304  
 $S_d$  262, 263  
 Sedimentation rhythms 178  
 Seismic velocities 53, 88, 284, 288, 313,  
   317, 330, 331, 334  
 Seismology 10, 105, 320  
 Self-gravitation 27, 28, 29, 30, 54, 116  
   - 120, 122, 124, 127  
 Shallow water effects 60, 135, 137  
 Shear  
 — modulus 280, 281, 354, 357, 364, 368  
 — stress 40, 300, 318  
 — zone 318, 319  
 Shelf 113, 114, 128, 130, 131, 134, 135,  
   146, 157, 159, 160 - 164  
 Shida number 45, 46, 77, 79

Skempton ratio 281, 288

Solar

- atmospheric tides 79, 221 - 243, 247
- constant 231, 248, 249
- (sunspot) cycle 205, 248, 261, 264
- eclipses 177, 178
- heat input 222, 223, 228, 231, 238, 242, 244
- insolation 222, 227, 228
- irradiance 79, 231, 247, 262
- radiation 79, 221, 226, 230, 231, 248, 251, 252, 255
- variation 262, 265, 267

Solid inner core 101, 154

Specific storage 281

Spectrum of

- climatic variations 255, 256
- earth tides 61, 66
- electric field 272, 273
- excitation 101, 102
- magnetic variations 264
- meteorology 205
- ocean oscillations 114
- polar motion 184, 189, 190, 191, 206
- solar radiation 247, 251, 252
- tidal
  - potential 17, 18
  - residuals 70, 73
- water level fluctuations 277
- volcanic events 304

Spherical harmonics 9, 14, 16, 44, 51, 106, 116, 149, 173, 174, 197, 261, 262, 266, 343, 353, 355

$S_q$  262, 263

Storage compressibility 280, 281, 287 - 288

Strain 144 - 147, 153, 154, 157, 158, 163, 164, 166, 179, 171, 280 - 283, 285, 295, 311

— -meters 78, 85, 87, 282

— sensitivity 282, 288

— -tilt coupling 29, 53, 87, 162, 164, 313, 324 - 327, 329 - 336

— coefficients 319, 324 - 326, 329, 336

Strength

- depth dependence of 319
- fracture 316, 319, 324, 336
- frictional 318, 319, 336

Stress-strain curve

- hysteresis of 317, 318
- non-linearity of 315

S-variation 262

$S_1$ -tide 22, 69, 71, 102, 129, 175, 251, 252, 264, 278, 304

$S_2$ -tide 22, 69, 71, 128, 129, 251, 252, 278, 304

$S_3$ -tide 223, 278, 279

$S_4$ -tide 251, 278, 279

T

Tectonic

- strain, accumulation of 287, 311, 312, 333, 334, 335, 336
- stress 293, 294

Thermal

- efficiency 231
- tidal source 230
- tides 262
- wind 226, 262

Thermosphere, see Upper atmosphere 231

3-D structure of the earth 29, 47, 49, 50, 53, 54

Tidal

- acceleration 9 - 12, 20, 21, 23, 24, 178, 295, 300, 303, 351
- age 129
- bulge 27, 176, 353, 359
- efficiency 285, 288
- forcing 9 - 26
- gravity 10, 23, 63, 68, 77, 80, 89, 102 - 104, 123, 145 - 147, 153, 155 - 160, 163, 166
- parameters 59 - 73, 146, 159, 160
- potential 9 - 26, 30, 31, 44, 45, 49, 59, 60, 97, 115, 116, 118, 122, 127 - 129, 144, 150, 247, 253, 295, 302, 303, 325, 343

## Tidal

- residuals 62, 70, 72, 73, 74
- strain 9, 21, 77, 80, 82, 85 - 89, 102, 104, 145, 146, 285, 290, 295, 302, 305
- stress 293 - 295, 297, 299, 300 - 303
- — rate 293
- tilt 9, 47, 77, 80 - 82, 85 - 89, 102, 145, 146, 155, 162, 295, 318
- — analysis 311, 321 - 323, 326, 328, 329, 336
- — response 311, 315, 321, 322, 325, 326, 328 - 332, 334, 336 - 337
- winds 263, 266, 268

Tide-generating potential, -forces: see tidal potential

## Tides

- barotropic 113, 116, 124, 129, 130, 139, 140
- co-oscillating 113, 129 - 131, 137
- internal 113, 116, 137 - 140
- open ocean 114
- shallow water 135, 137
- Tilt 144 - 149, 152, 153, 155 - 159, 163, 164
- factor 47, 79
- -meters 46, 47, 78, 85 - 87, 162, 321, 330
- -site tensors 324, 325, 326

## Topographic

- coupling 97
- effect 79, 86
- Topography 118, 131, 132, 134, 137, 145, 146, 173, 188, 224, 311, 327, 336, 349, 350, 357, 358

Transient tidal response 285, 287

Transmissivity 281, 290

Tropopause 226

Troposphere: see lower atmosphere

226, 230, 231, 233, 234

— jetstream 226

Tschebyscheff polynomials 62, 63, 71, 72

Turkish-German earthquake prediction research program 89, 319 ff.

## U

- Universal time (UT) 173, 174, 176, 223
- Upper atmosphere 223, 231, 236
- Uranus 11

## V

## Variations

- in the declinations of stars 102
- of latitude 102, 184
- Venus 11, 19, 20, 176, 177
- Very Long Baseline Interferometry (VLBI) 77, 102, 103, 158, 174, 175, 177, 206, 207
- Viscoelasticity 28, 29, 53, 154, 179, 185, 354
- Visco-magnetic coupling 97
- Viscosity, viscous 15, 188, 281, 288, 345, 350, 354, 356 - 365, 368, 369
- Volcanic
  - eruption 301, 305
  - shock 302, 305

## W

## Waves

- edge 135
- internal 237, 240 - 242
- Kelvin 123, 133 - 135, 137, 238
- planetary 221, 228, 229, 230, 233, 237, 239 - 241, 244, 245
- Poincaré 133 - 135, 137
- Rossby 236, 238, 245
- Rossby-Haurwitz 205, 236 - 238, 243, 245
- shelf 135
- Sverdrup 134, 137
- Yanai 238
- Well tides 277, 278, 288, 289
- Wobble 95 - 106, 183 - 215





# List of Contributors

**Emter, Dieter**

Black Forest Observatory Schiltach (BFO), Universitäten Karlsruhe/Stuttgart,  
Heubach 206, D-77709 Wolfach, Germany

**Jentzsch, Gerhard**

Institut für Geowissenschaften, Friedrich-Schiller-Universität Jena,  
Burgweg 11, D-07749 Jena, Germany

**Kümpel, Hans-Joachim**

Abt. Angewandte Geophysik, Geologisches Institut, Universität Bonn,  
Nussallee 8, D-53115 Bonn, Germany

**Möllenhoff, Claus**

Landessternwarte Königstuhl, D-69117 Heidelberg, Germany

**Olsen, Nils**

Department of Geophysics, University of Copenhagen, Juliane Maries vej 30,  
DK-2100 Copenhagen Oe, Denmark

**Plag, Hans-Peter**

Institut für Geophysik, Christian-Albrechts-Universität Kiel,  
Olshausenstr. 40, D-24118 Kiel, Germany

**Schäfer, Gerhard**

Max-Planck-Gesellschaft, Arbeitsgruppe Gravitationstheorie,  
Friedrich-Schiller-Universität Jena, D-07743 Jena, Germany

**Schwintzer, Peter**

GeoForschungsZentrum Potsdam (GFZ), Telegrafenberg A 17,  
D-14473 Potsdam, Germany

**Spohn, Tilman**

Institut für Planetologie, Westfälische Wilhelms-Universität,  
W. Klemmstr. 10, D-48149 Münster, Germany

**Volland, Hans**

Radioastronomisches Institut, Universität Bonn, Auf dem Hügel 71,  
D-53121 Bonn, Germany

**Wang, Rongjiang**

GeoForschungsZentrum Potsdam (GFZ), Telegrafenberg A 17,  
D-14473 Potsdam, Germany

**Wenzel, Hans-Georg**

Geodätisches Institut, Universität Karlsruhe, Englerstr. 7,  
D-76128 Karlsruhe, Germany

**Westerhaus, Malte**

GeoForschungsZentrum Potsdam (GFZ), Telegrafenberg A 17,  
D-14473 Potsdam, Germany

**Wilhelm, Helmut**

Geophysikalisches Institut, Universität Karlsruhe, Hertzstr. 16,  
D-76187 Karlsruhe, Germany

**Wünsch, Johannes**

Sternwarte Sonneberg, Sternwartestr. 32, D-96515 Sonneberg, Germany

**Zahel, Wilfried**

Institut für Meereskunde, Universität Hamburg, Troplowitzstr. 7,  
D-22529 Hamburg, Germany

**Zürn, Walter**

Black Forest Observatory Schiltach (BFO), Universitäten Karlsruhe/Stuttgart,  
Heubach 206, D-77709 Wolfach, Germany

# Lecture Notes in Earth Sciences

- Vol. 1: Sedimentary and Evolutionary Cycles. Edited by U. Bayer and A. Seilacher. VI, 465 pages. 1985. (out of print).
- Vol. 2: U. Bayer, Pattern Recognition Problems in Geology and Paleontology. VII, 229 pages. 1985. (out of print).
- Vol. 3: Th. Aigner, Storm Depositional Systems. VIII, 174 pages. 1985.
- Vol. 4: Aspects of Fluvial Sedimentation in the Lower Triassic Buntsandstein of Europe. Edited by D. Mader. VIII, 626 pages. 1985. (out of print).
- Vol. 5: Paleogeothermics. Edited by G. Buntebarth and L. Stegena. II, 234 pages. 1986.
- Vol. 6: W. Ricken, Diagenetic Bedding. X, 210 pages. 1986.
- Vol. 7: Mathematical and Numerical Techniques in Physical Geodesy. Edited by H. Sünkel. IX, 548 pages. 1986.
- Vol. 8: Global Bio-Events. Edited by O. H. Walliser. IX, 442 pages. 1986.
- Vol. 9: G. Gerdes, W. E. Krumbein, Biolaminated Deposits. IX, 183 pages. 1987.
- Vol. 10: T.M. Peryt (Ed.), The Zechstein Facies in Europe. V, 272 pages. 1987.
- Vol. 11: L. Landner (Ed.), Contamination of the Environment. Proceedings, 1986. VII, 190 pages. 1987.
- Vol. 12: S. Turner (Ed.), Applied Geodesy. VIII, 393 pages. 1987.
- Vol. 13: T. M. Peryt (Ed.), Evaporite Basins. V, 188 pages. 1987.
- Vol. 14: N. Cristescu, H. I. Ene (Eds.), Rock and Soil Rheology. VIII, 289 pages. 1988.
- Vol. 15: V. H. Jacobshagen (Ed.), The Atlas System of Morocco. VI, 499 pages. 1988.
- Vol. 16: H. Wanner, U. Siegenthaler (Eds.), Long and Short Term Variability of Climate. VII, 175 pages. 1988.
- Vol. 17: H. Bahlburg, Ch. Breitzkreuz, P. Giese (Eds.), The Southern Central Andes. VIII, 261 pages. 1988.
- Vol. 18: N.M.S. Rock, Numerical Geology. XI, 427 pages. 1988.
- Vol. 19: E. Groten, R. Strauß (Eds.), GPS-Techniques Applied to Geodesy and Surveying. XVII, 532 pages. 1988.
- Vol. 20: P. Baccini (Ed.), The Landfill. IX, 439 pages. 1989.
- Vol. 21: U. Förstner, Contaminated Sediments. V, 157 pages. 1989.
- Vol. 22: I. I. Mueller, S. Zerbini (Eds.), The Interdisciplinary Role of Space Geodesy. XV, 300 pages. 1989.
- Vol. 23: K. B. Föllmi, Evolution of the Mid-Cretaceous Triad. VII, 153 pages. 1989.
- Vol. 24: B. Knipping, Basalt Intrusions in Evaporites. VI, 132 pages. 1989.
- Vol. 25: F. Sansò, R. Rummel (Eds.), Theory of Satellite Geodesy and Gravity Field Theory. XII, 491 pages. 1989.
- Vol. 26: R. D. Stoll, Sediment Acoustics. V, 155 pages. 1989.
- Vol. 27: G.-P. Merkler, H. Militzer, H. Hötzl, H. Armbruster, J. Brauns (Eds.), Detection of Subsurface Flow Phenomena. IX, 514 pages. 1989.
- Vol. 28: V. Mosbrugger, The Tree Habit in Land Plants. V, 161 pages. 1990.
- Vol. 29: F. K. Brunner, C. Rizos (Eds.), Developments in Four-Dimensional Geodesy. X, 264 pages. 1990.
- Vol. 30: E. G. Kauffman, O.H. Walliser (Eds.), Extinction Events in Earth History. VI, 432 pages. 1990.
- Vol. 31: K.-R. Koch, Bayesian Inference with Geodetic Applications. IX, 198 pages. 1990.
- Vol. 32: B. Lehmann, Metallogeny of Tin. VIII, 211 pages. 1990.
- Vol. 33: B. Allard, H. Borén, A. Grimvall (Eds.), Humic Substances in the Aquatic and Terrestrial Environment. VIII, 514 pages. 1991.
- Vol. 34: R. Stein, Accumulation of Organic Carbon in Marine Sediments. XIII, 217 pages. 1991.
- Vol. 35: L. Håkanson, Ecometric and Dynamic Modelling. VI, 158 pages. 1991.
- Vol. 36: D. Shangguan, Cellular Growth of Crystals. XV, 209 pages. 1991.

- Vol. 37: A. Armanini, G. Di Silvio (Eds.), *Fluvial Hydraulics of Mountain Regions*. X, 468 pages. 1991.
- Vol. 38: W. Smykatz-Kloss, S. St. J. Warne, *Thermal Analysis in the Geosciences*. XII, 379 pages. 1991.
- Vol. 39: S.-E. Hjelt, *Pragmatic Inversion of Geophysical Data*. IX, 262 pages. 1992.
- Vol. 40: S. W. Petters, *Regional Geology of Africa*. XXIII, 722 pages. 1991.
- Vol. 41: R. Pflug, J. W. Harbaugh (Eds.), *Computer Graphics in Geology*. XVII, 298 pages. 1992.
- Vol. 42: A. Cendrero, G. Lüttig, F. Chr. Wolff (Eds.), *Planning the Use of the Earth's Surface*. IX, 556 pages. 1992.
- Vol. 43: N. Clauer, S. Chaudhuri (Eds.), *Isotopic Signatures and Sedimentary Records*. VIII, 529 pages. 1992.
- Vol. 44: D. A. Edwards, *Turbidity Currents: Dynamics, Deposits and Reversals*. XIII, 175 pages. 1993.
- Vol. 45: A. G. Herrmann, B. Knipping, *Waste Disposal and Evaporites*. XII, 193 pages. 1993.
- Vol. 46: G. Galli, *Temporal and Spatial Patterns in Carbonate Platforms*. IX, 325 pages. 1993.
- Vol. 47: R. L. Littke, *Deposition, Diagenesis and Weathering of Organic Matter-Rich Sediments*. IX, 216 pages. 1993.
- Vol. 48: B. R. Roberts, *Water Management in Desert Environments*. XVII, 337 pages. 1993.
- Vol. 49: J. F. W. Negendank, B. Zolitschka (Eds.), *Paleolimnology of European Maar Lakes*. IX, 513 pages. 1993.
- Vol. 50: R. Rummel, F. Sansò (Eds.), *Satellite Altimetry in Geodesy and Oceanography*. XII, 479 pages. 1993.
- Vol. 51: W. Ricken, *Sedimentation as a Three-Component System*. XII, 211 pages. 1993.
- Vol. 52: P. Ergenzinger, K.-H. Schmidt (Eds.), *Dynamics and Geomorphology of Mountain Rivers*. VIII, 326 pages. 1994.
- Vol. 53: F. Scherbaum, *Basic Concepts in Digital Signal Processing for Seismologists*. X, 158 pages. 1994.
- Vol. 54: J. J. P. Zijlstra, *The Sedimentology of Chalk*. IX, 194 pages. 1995.
- Vol. 55: J. A. Scales, *Theory of Seismic Imaging*. XV, 291 pages. 1995.
- Vol. 56: D. Müller, D. I. Groves, *Potassic Igneous Rocks and Associated Gold-Copper Mineralization*. 2nd updated and enlarged Edition. XIII, 238 pages. 1997.
- Vol. 57: E. Lallier-Vergès, N.-P. Tribouillard, P. Bertrand (Eds.), *Organic Matter Accumulation*. VIII, 187 pages. 1995.
- Vol. 58: G. Sarwar, G. M. Friedman, *Post-Devonian Sediment Cover over New York State*. VIII, 113 pages. 1995.
- Vol. 59: A. C. Kibblewhite, C. Y. Wu, *Wave Interactions As a Seismo-acoustic Source*. XIX, 313 pages. 1996.
- Vol. 60: A. Kleusberg, P. J. G. Teunissen (Eds.), *GPS for Geodesy*. VII, 407 pages. 1996.
- Vol. 61: M. Breunig, *Integration of Spatial Information for Geo-Information Systems*. XI, 171 pages. 1996.
- Vol. 62: H. V. Lyatsky, *Continental-Crust Structures on the Continental Margin of Western North America*. XIX, 352 pages. 1996.
- Vol. 63: B. H. Jacobsen, K. Mosegaard, P. Sibani (Eds.), *Inverse Methods*. XVI, 341 pages. 1996.
- Vol. 64: A. Armanini, M. Michiue (Eds.), *Recent Developments on Debris Flows*. X, 226 pages. 1997.
- Vol. 65: F. Sansò, R. Rummel (Eds.), *Geodetic Boundary Value Problems in View of the One Centimeter Geoid*. XIX, 592 pages. 1997.
- Vol. 66: H. Wilhelm, W. Zürn, H.-G. Wenzel (Eds.), *Tidal Phenomena*. VII, 398 pages. 1997.