

Contents

Foreword	ix
P. J. Sellers	
Preface.....	xv
M. D. King, C. L. Parkinson, K. C. Partington, R. G. Williams	
Acknowledgments	xviii
The Dynamic Atmosphere	1
Introduction	5
M. D. King	
Clouds: Are the Shutters of the Earth Changing?	10
D. P. Wylie, W. P. Menzel	
Cloud Optical and Microphysical Properties	15
M. D. King	
Clouds and the Earth's Radiation Budget	21
N. G. Loeb, T. Wong	
Water Vapor	26
B. J. Soden	
A World of Rain	30
R. F. Adler, G. J. Huffman, S. Curtis	
Hurricanes: Connections with Climate Change	36
J. B. Halverson	
Lightning	44
S. J. Goodman, D. E. Buechler, E. W. McCaul, Jr.	
Warming and Cooling of the Atmosphere	53
Q. Fu, C. M. Johanson	
Dust in the Wind	56
N. C. Hsu, S.-C. Tsay, M. D. King, D. J. Diner	
Atmospheric Pollution: A Global Problem	61
D. P. Edwards	
Ship Tracks	66
S. Platnick	
Airplane Contrails	71
P. Minnis	
Weekly Cycle of Nitrogen Dioxide Pollution from Space	74
S. Beirle, U. Platt, T. Wagner, M. O. Wenig, J. F. Gleason	
The Ozone Hole	78
R. D. McPeters	

The Chlorine Threat to Earth's Ozone Shield	82
M. L. Santee	
The Vital Land	88
Introduction	91
K. C. Partington	
The San Andreas Fault: Adjustments in the Earth's Crust	94
D. T. Sandwell, B. R. Smith	
Mt. Pinatubo: An Enduring Volcanic Hazard	97
P. J. Mousginis-Mark	
Extreme Floods	100
S. Caquard, G. R. Brakenridge	
Satellite Monitoring of Ebola Virus Hemorrhagic Fever Epidemics	104
J. E. Pinzon, C. J. Tucker	
Snow Cover: The Most Dynamic Feature on the Earth's Surface	110
D. K. Hall, J. L. Foster	
Glaciers: Scribes of Climate; Harbingers of Change	116
D. K. Hall, R. S. Williams, Jr.	
Boreal Forests: A Lengthening Growing Season	120
K. C. McDonald, J. S. Kimball	
Soil Moisture: A Critical Underlying Role	124
M. F. Jasinski, T. J. Jackson, M. Owe, B. A. Cosgrove	
The Sunlit Earth	129
C. B. Schaaf	
Temperature of the Land Surface	136
Z. Wan	
The Restless Ocean	142
Introduction	145
R. G. Williams	
Ocean Bathymetry and Plate Tectonics	149
D. T. Sandwell	
Ocean Surface Topography and Circulation	153
L.-L. Fu	
Heat in the Ocean	156
P. J. Minnett	
Sea Level Rise	162
G. T. Mitchum, R. S. Nerem	
Tides	165
R. D. Ray	
Winds Over Ocean	168
W. T. Liu, X. Xie	
The Stormy Atlantic	172
D. K. Woolf, I. S. Robinson	
The Ocean Biosphere	176
C. R. McClain, G. C. Feldman	

Coccolithophores and the ‘Sea of Milk’	181
W. M. Balch	
Coral Bleaching	184
G. Liu, A. E. Strong	
Hunting Red Tides From Space	187
K. L. Carder, J. J. Walsh, J. P. Cannizzaro	
Marine Sediments	191
J. G. Acker	
Tsunamis	196
R. Scharroo	
 The Frozen Caps	202
Introduction	205
K. C. Partington	
Antarctica: A Continent Revealed	209
K. C. Jezek	
Ice Sheets on the Move	214
E. Rignot, I. Joughin	
Ice Sheets and the Threat to Global Sea Level	218
R. H. Thomas, R. A. Bindschadler	
The Great White Ocean: The Arctic’s Changing Sea Ice Cover	226
C. L. Parkinson	
Bound Together: Arctic Sea Ice, Ocean, and Atmosphere	232
C. L. Parkinson	
Sea Ice: The Shifting Crust of the Southern Ocean	238
M. R. Drinkwater, J. C. Comiso	
Antarctic Polynyas: Ventilation, Bottom Water, and High Productivity for the World’s Oceans	243
J. C. Comiso, M. R. Drinkwater	
 Evidence of Our Tenure	250
Introduction	253
C. L. Parkinson	
Mapping the Ancient Maya Landscape from Space	258
T. L. Sever, D. E. Irwin	
Global Land Use Changes	262
J. A. Foley, N. Ramankutty, B. Leff, H. K. Gibbs	
The Changing Role of Fire on Earth	266
D. P. Roy, C. O. Justice	
The Tropical Rain Forest: Threatened Powerhouse of the Biosphere	274
K. C. McDonald, B. Chapman, J. S. Kimball, R. Zimmermann	
The Green Wave	280
L. Zhou, R. K. Kaufmann, C. J. Tucker, R. B. Myneni	
Monitoring Urban Areas Globally and Locally	286
A. Schneider	
Gray Wave of the Great Transformation	291
M. L. Imhoff, L. Bounoua, J. M. Shepherd	

Urban Heat Islands	298
D. A. Quattrochi, M. G. Estes, Jr., C. A. Laymon, W. L. Crosson, B. F. Howell, J. C. Luvall, D. L. Rickman	
Urbanization in China: The Pearl River Delta Example	302
K. C. Seto	
Water Issues in the Fertile Crescent: Irrigation in Southeastern Turkey	306
M. Ozdogan, C. E. Woodcock, G. D. Salvucci	
Chronicling the Destruction of Eden: The Draining of the Iraqi Marshes	312
G. T. Koeln, Y. Naficy, C. L. Parkinson	
Destruction of the Aral Sea	320
P. P. Micklin	
The Desiccation of Lake Chad	326
M. T. Coe, C. Birkett	
Industrial Pollution in the Russian Arctic	329
W. G. Rees	
Oil Spills at Sea	332
F. Parthiot	
Epilogue	337
Appendix 1 – Satellites and Satellite Orbits	339
M. D. King	
Appendix 2 – Glossary	347
Appendix 3 – Acronyms	363
Appendix 4 – Contributors	367
Index	374
About the Editors	391