

# Earth Science 2012



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## princeton primers in climate

*Princeton Primers in Climate* is a new series of short, authoritative books that explain the state of the art in climate-science research. Written specifically for students, researchers, and scientifically minded general readers looking for succinct and readable books on this frequently misunderstood subject, these primers reveal the physical workings of the global climate system with unmatched accessibility and detail. *Princeton Primers in Climate* is the ideal first place to turn to get the essential facts, presented with uncompromising clarity, and to begin further investigation—whether in the classroom or in one's own reading chair.

NEW

### Climate and the Oceans

Geoffrey K. Vallis



“In this crystal-clear little book, Geoffrey Vallis masterfully explains the basics of physical oceanography and the role of the oceans in the climate system. He writes for those conversant with some university-level mathematics and physics, but whose knowledge of the oceans and climate is limited. The book moves smoothly from fundamental principles to topics of current research interest, including natural climate variability, such as El Niño, and the daunting challenge of man-made climate change, or global warming.”

—Richard Somerville, Scripps Institution of Oceanography

*Climate and the Oceans* is the first place to turn to get the essential facts about this crucial aspect of the Earth's climate system. Ideal for students and nonspecialists alike, this primer offers the most concise and up-to-date overview of the subject available.

Geoffrey K. Vallis is professor and senior scientist in the Atmospheric and Oceanic Sciences Program and the Geophysical Fluid Dynamics Laboratory, Princeton University.

2011. 248 pages. 32 line illus. 2 tables.  
Pa: 978-0-691-15028-4 \$24.95 | £16.95  
Cl: 978-0-691-14467-2 \$80.00 | £55.00

cover image: *moon orbiting earth* © reksveks, courtesy of shutterstock

NEW

## The Cryosphere

Shawn J. Marshall



“Distinguished glaciologist Shawn Marshall leads a lucid tour through the essentials of ice in the environment, with more than enough information to satisfy the casual student, and additional pointers to steer the serious scientist.”

—Richard Alley,

Pennsylvania State University

In this primer, glaciologist Shawn Marshall introduces readers to the cryosphere and the broader role it plays in our global climate system.

Shawn J. Marshall is the Canada Research Chair in Climate Change at the University of Calgary.

2011. 304 pages. 34 line illus. 8 tables.

Pa: 978-0-691-14526-6 \$24.95 | £16.95

Cl: 978-0-691-14525-9 \$80.00 | £55.00

FORTHCOMING

## Atmosphere, Clouds, and Climate

David Randall

“In this book, one of the leaders of the field condenses a huge amount of climate theory into a very small space. This is done in an informal narrative style with a minimum of equations and other hard technical details, but with a serious dedication to constructing a coherent and logical storyline without glossing over essentials. I have not seen another book like this.”

—Adam Sobel, Columbia University

The atmosphere is critical to climate change. It can amplify shifts in the climate system, and also mitigate them. This primer offers a short, reader-friendly introduction to these atmospheric processes and how they work, written by a leading expert on the subject.

David Randall is professor of atmospheric science at Colorado State University.

May 2012. 288 pages. 19 halftones. 21 line illus. 5 tables.

Pa: 978-0-691-14375-0 \$27.95 | £19.95

Cl: 978-0-691-14374-3 \$75.00 | £52.00

## The Global Carbon Cycle

David Archer



“David Archer is one of the world’s leading experts advancing our understanding of the consequences of carbon dioxide emissions in the context of geologic time. Archer’s book explains how the consequences of our fossil-fuel economy will outlast even our nuclear waste. This book is essential reading—it wakes us up to the long-term consequences of our fossil-fuel folly.”

—Ken Caldeira, Carnegie Institution for Science

2010. 216 pages. 25 line illus.

Pa: 978-0-691-14414-6 \$24.95 | £16.95

Cl: 978-0-691-14413-9 \$70.00 | £48.95

### FORTHCOMING IN THE SERIES

#### Paleoclimate

Michael L. Bender

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Andrew Ingersoll

#### Ecosystems and Climate

David Schimel

#### Natural Climate Change

Mark Cane

#### Climate Sensitivity

Jeffrey Kiehl

#### Terrestrial Hydrology and

the Climate System

Eric F. Wood

#### The Sun’s Influence on Climate

Joanna D. Haigh

#### Abrupt Climate Change

Jonathan Overpeck

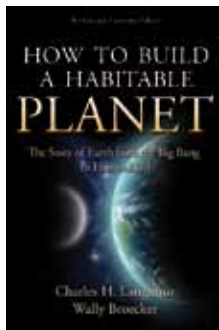
FORTHCOMING

Revised and Expanded Edition

## How to Build a Habitable Planet

The Story of Earth from the Big Bang to Humankind

Charles H. Langmuir & Wally Broecker



“This is a magnificent book, a successful and very worthwhile revision of its legendary and coveted first edition. The new edition offers more than a minor dusting off of the material. There are some completely new chapters and the authors have also done

a good job of introducing newer discoveries. This book is more timely than ever, and I greet this revision with uncontained enthusiasm.”

—Raymond T. Pierrehumbert, University of Chicago

Since its first publication more than twenty-five years ago, *How to Build a Habitable Planet* has established a legendary reputation as an accessible yet scientifically impeccable introduction to the origin and evolution of the Earth, from the Big Bang through the rise of human civilization. This classic account of how our habitable planet was assembled from the stuff of stars introduced readers to planetary, Earth, and climate science by way of a fascinating narrative. Now this great book has been made even better. Harvard geochemist Charles Langmuir has worked closely with the original author, Wally Broecker, one of the world’s leading Earth scientists, to revise and expand the book for a new generation of readers for whom active planetary stewardship is becoming imperative.

Charles H. Langmuir is the Higgins Professor of Geochemistry at Harvard University. Wally Broecker is the Newberry Professor of Earth and Environmental Sciences at Columbia University.

May 2012. 720 pages. 16 color plates. 62 halftones. 220 line illus. 18 tables.

Cl: 978-0-691-14006-3 \$39.95 | £27.95

## The Great Ocean Conveyor

Discovering the Trigger for Abrupt Climate Change

Wally Broecker



“Wally Broecker is one of the great pioneers of paleoclimatology.... Relating his breakthroughs and setbacks, he portrays science as a ‘continual struggle to understand more fully and more accurately how the world really works.’”

—*Nature*

2010. 176 pages. 10 halftones. 40 line illus. 12 maps.  
Cl: 978-0-691-14354-5 \$27.95 | £19.95

## How to Find a Habitable Planet

James Kasting



“A fascinating read—everything you need to know about habitable worlds.”

—Sara Seager, Massachusetts Institute of Technology

*Science Essentials*

2010. 352 pages. 16 color illus. 57 halftones. 15 line illus. 4 tables.  
Cl: 978-0-691-13805-3 \$29.95 | £19.95

Winner of the 2009 Walter P. Kistler Award, Foundation For the Future  
One of *Australian's* Best Books of 2009

## The Long Thaw

How Humans Are Changing the Next 100,000 Years of Earth’s Climate

David Archer



“A beautifully written primer on why climate change matters hugely for our future.”

—*New Scientist*

*Science Essentials*

2010. 192 pages. 2 halftones. 20 line illus. 2 tables.  
Pa: 978-0-691-14811-3 \$16.95 | £11.95  
Cl: 978-0-691-13654-7 \$22.95 | £15.95

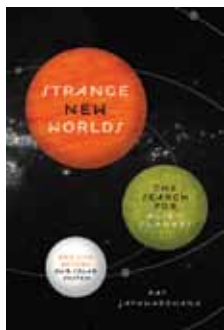
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NEW

## Strange New Worlds

The Search for Alien Planets and Life beyond Our Solar System

Ray Jayawardhana



“Professor Jayawardhana is an award-winning science writer and an eminent planet-hunter, and so is the perfect person to write an accessible guidebook to the new worlds we’re discovering in our galaxy. He explains

how many of those discovered so far are pretty exotic, bloated and massive or scorchingly close to their sun, and how we’ve even had our first weather report for another world. But what’s most exciting is that this book explains how we now have within our grasp the ability to spot a true twin of Earth.”

—BBC Focus

Ray Jayawardhana is professor and Canada Research Chair in Observational Astrophysics at the University of Toronto.

2011. 272 pages. 3 halftones. 25 line illus. 4 tables.  
Cl: 978-0-691-14254-8 \$24.95 | £16.95  
Not for sale in Canada

## The Medea Hypothesis

Is Life on Earth Ultimately Self-Destructive?

Peter Ward



“The point of *The Medea Hypothesis* is that life, rather than helping to regulate the Earth ‘System’ by negative feedbacks, does all it can to consume the resources available—sowing the seeds of its own extinction.”

—Dr. Henry Gee, *BBC Focus*

Science Essentials

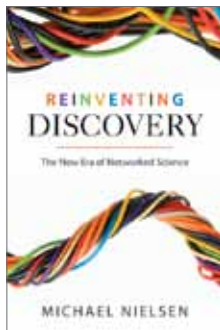
2009. 208 pages. 11 line illus. 2 tables.  
Cl: 978-0-691-13075-0 \$24.95 | £16.95

NEW

## Reinventing Discovery

The New Era of Networked Science

Michael Nielsen



“Science has always been a contact sport; the interaction of many minds is the engine of the discipline. Michael Nielsen has given us an unparalleled account of how new tools for collaboration are transforming scientific practice. *Reinventing*

*Discovery* doesn’t just help us understand how the sciences are changing, it shows us how we can participate in the change.”

—Clay Shirky, author of *Here Comes Everybody* and *Cognitive Surplus*

Michael Nielsen is one of the pioneers of quantum computing. He is an essayist, speaker, and advocate of open science.

2011. 272 pages. 6 halftones. 8 line illus.  
Cl: 978-0-691-14890-8 \$24.95 | £16.95

One of *Choice's* Outstanding Academic Titles for 2009

## James Lovelock

In Search of Gaia

John Gribbin & Mary Gribbin



“John and Mary Gribbin lead us on an exploration of how Lovelock came to his perspective of Earth.... They offer valuable insights not only into how Lovelock came up with the idea for Gaia but more generally how his mind works and where the ideas for his

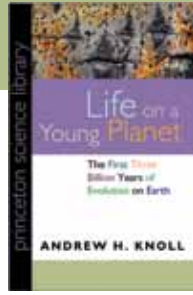
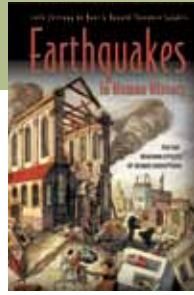
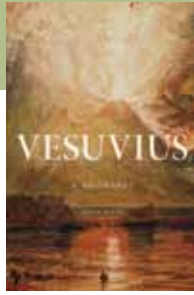
scores of inventions come from.”

—Lee R. Kump, *Science*

2009. 288 pages. 19 halftones.  
Cl: 978-0-691-13750-6 \$24.95

For sale only in the United States, its territories and dependencies

also available



**Predicting the Unpredictable**  
The Tumultuous Science of Earthquake  
Prediction  
**Susan Hough**

“Susan Hough’s book about earthquake prediction reminds us that many respectable scientists and numerous nutcases have tried—and failed.”  
—Roger Bilham, *Nature*

2010. 272 pages. 36 halftones. 4 line illus. 4 maps.  
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What We Know (and Don’t Know) about  
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Measure of an Earthquake, Measure of a Man

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**Alwyn Scarth**

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*Not for sale in the United Kingdom or Republic of Ireland*

**Apocalypse**  
Earthquakes, Archaeology, and the Wrath of God  
**Amos Nur**  
With Dawn Burgess

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Cl: 978-0-691-01602-3 \$26.95 | £18.95

One of *Choice’s* Outstanding Academic Titles for 2005

**Earthquakes in Human History**  
The Far-Reaching Effects of Seismic Disruptions  
**Jelle Zeilinga de Boer &  
Donald Theodore Sanders**

2007. 304 pages. 15 halftones. 30 line illus. 1 tables.  
Pa: 978-0-691-12786-6 \$24.95 | £16.95

**Also by Jelle Zeilinga de Boer &  
Donald Theodore Sanders**  
With a foreword by Robert D. Ballard  
**Volcanoes in Human History**  
The Far-Reaching Effects of Major Eruptions

2004. 320 pages. 18 halftones. 22 line illus. 2 tables.  
Pa: 978-0-691-11838-3 \$26.95 | £18.95

One of the *New York Times* Notable Books of 1997  
With a new foreword by Carl Zimmer  
**T. rex and the Crater of Doom**  
**Walter Alvarez**

*Princeton Science Library*

2008. 216 pages. 8 color plates. 15 halftones. 2 line illus.  
Pa: 978-0-691-13103-0 \$16.95 | £11.95  
*Not for sale in the Commonwealth (except Canada)*

Winner of the 2003 Phi Beta Kappa Book Award in Science

**Life on a Young Planet**  
The First Three Billion Years of Evolution on Earth  
**Andrew H. Knoll**

*Princeton Science Library*

2004. 296 pages. 33 color illus. 25 halftones. 47 line illus.  
Pa: 978-0-691-12029-4 \$26.95 | £18.95

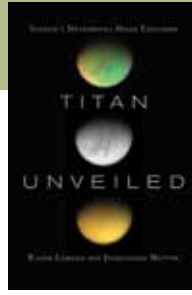
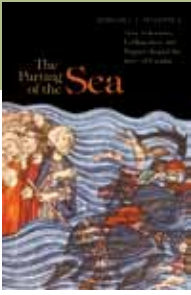
One of *Choice’s* Outstanding Academic Titles for 2006

**Extinction**  
How Life on Earth Nearly Ended 250 Million  
Years Ago  
**Douglas H. Erwin**

2008. 320 pages. 32 halftones. 32 line illus.  
Pa: 978-0-691-13628-8 \$24.95 | £16.95

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How Volcanoes, Earthquakes, and Plagues Shaped the Story of Exodus

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2011. 264 pages. 2 halftones. 3 line illus. 8 maps.  
Pa: 978-0-691-15021-5 \$22.95 | £15.95  
Cl: 978-0-691-13770-4 \$39.95 | £27.95

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Pa: 978-0-691-14633-1 \$19.95 | £13.95  
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Mayor of Rome

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2007. 264 pages. 72 halftones. 19 line illus. 4 tables. 20 maps.  
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One of the "100 Notable Books of the Year" for 2004, *New York Times Book Review*

One of the "Top Science Books of the Year" for 2004, *Discover Magazine*

## Devil in the Mountain

A Search for the Origin of the Andes

**Simon Lamb**

2006. 352 pages. 36 halftones. 38 line illus.  
Pa: 978-0-691-12620-3 \$24.95 | £16.95

Winner of the 2006 Phi Beta Kappa Book Award in Science

With a new afterword by the author

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How Humans Took Control of Climate

**William F. Ruddiman**

*Princeton Science Library*

2010. 240 pages. 19 halftones. 19 line illus. 5 tables. 7 maps.  
Pa: 978-0-691-14634-8 \$19.95 | £13.95

Winner of the 2001 Phi Beta Kappa Book Award in Science

One of *Choice's* Outstanding Academic Titles for 2001

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Ice Cores, Abrupt Climate Change, and Our Future

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One of *Choice's* Outstanding Academic Titles for 2002  
Honorable Mention, 2001 Award for Best Professional/Scholarly Book  
in Geography and Earth Science, Association of American Publishers

With new commentary by the author

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The Impending World Oil Shortage

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2009. 232 pages. 25 halftones. 50 line illus.  
Pa: 978-0-691-14119-0 \$17.95 | £12.50

## Our Affair with El Niño

How We Transformed an Enchanting Peruvian Current into a Global Climate Hazard

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Pa: 978-0-691-12622-7 \$28.95 | £19.95

Also by S. George Philander

## Is the Temperature Rising?

The Uncertain Science of Global Warming

2000. 240 pages. 8 halftones. 85 line illus. 5 tables.  
Pa: 978-0-691-05034-8 \$28.95 | £19.95

FORTHCOMING

Second Edition

## Global Environment

Water, Air, and Geochemical Cycles

Elizabeth Kay Berner & Robert A. Berner

"Describing water and element cycles within a global context, this newly edited and improved textbook contains valuable additional detail and information but also remains true to the strengths of its original scope."

—James Bishop, University of California, Berkeley and Lawrence Berkeley National Laboratory

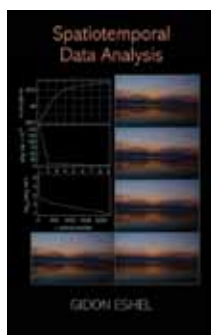
Elizabeth Kay Berner is a lecturer in geology at the University of Connecticut and research affiliate in the Department of Geology and Geophysics at Yale University. Robert A. Berner is the Alan M. Bateman Professor of Geology and Geophysics Emeritus at Yale University.

May 2012. 480 pages. 31 halftones. 116 line illus. 83 tables.  
Cl: 978-0-691-13678-3 \$85.00 | £59.00

NEW

## Spatiotemporal Data Analysis

Gidon Eshel



"*Spatiotemporal Data Analysis* is accessible and applicable without sacrificing rigor. The key is a steady stream of well-chosen examples and, most unusual in any textbook, a distinctive narrative voice that guides readers through the material, explaining

the details while making sure the big picture is always in view. It will become an essential text for earth scientists and many others who analyze spatiotemporal data."

—Mark Cane, Columbia University

Gidon Eshel is Bard Center Fellow at Bard College.

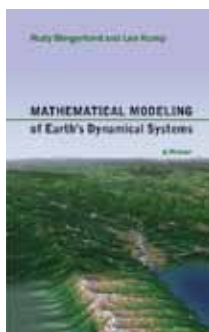
2012. 336 pages. 76 halftones. 19 line illus.  
Cl: 978-0-691-12891-7 \$85.00 | £59.00

NEW

## Mathematical Modeling of Earth's Dynamical Systems

A Primer

Rudy Slingerland & Lee Kump



"[A] must-read for all geoscientists, and not just students. This excellent primer offers bite-size gems of insight into the world of quantitative geosciences applications, covers both mathematical and modeling concepts, and offers practical exercises

to build expertise."

—James P. M. Syvitski, Community Surface Dynamics Modeling System

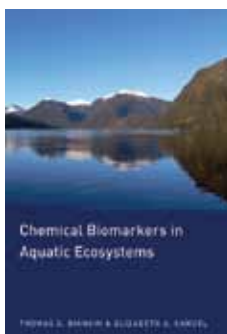
Rudy Slingerland and Lee Kump are professors of geosciences at Pennsylvania State University.

2011. 248 pages. 3 halftones. 72 line illus. 9 tables. 1 map.  
Pa: 978-0-691-14514-3 \$45.00 | £30.95  
Cl: 978-0-691-14513-6 \$99.50 | £69.95

NEW

## Chemical Biomarkers in Aquatic Ecosystems

Thomas S. Bianchi & Elizabeth A. Canuel



"This is a must-have volume for all hands-on researchers, in aquatic biogeochemistry, organic geochemistry, and molecular ecology, from beginning undergraduates to experienced senior researchers."

—Stuart G. Wakeham, Skidaway Institute of Oceanography

Thomas S. Bianchi is professor of oceanography at Texas A&M University. Elizabeth A. Canuel is professor of marine science at the Virginia Institute of Marine Science, College of William & Mary.

2011. 416 pages. 78 halftones. 117 line illus. 26 tables.  
Cl: 978-0-691-13414-7 \$95.00 | £65.00



NEW

## Agent-Based and Individual-Based Modeling

A Practical Introduction

Steven F. Railsback & Volker Grimm



“Railsback and Grimm have written a superb introduction to agent-based models. They combine hands-on programming exercises, introductions to some of the core

concepts in complex systems, and instruction in model design and analysis.”

—Scott E. Page, author of *Diversity and Complexity*

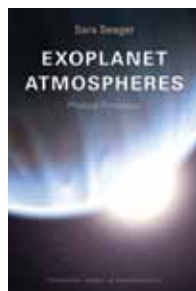
Steven F. Railsback is adjunct professor of mathematics at Humboldt State University and a consulting environmental scientist. Volker Grimm is senior scientist in the Department of Ecological Modeling at the Helmholtz Centre for Environmental Research – UFZ in Leipzig and professor at the University of Potsdam.

2011. 352 pages. 62 line illus. 9 tables.  
Pa: 978-0-691-13674-5 \$55.00 | £37.95  
Cl: 978-0-691-13673-8 \$99.50 | £69.95

## Exoplanet Atmospheres

Physical Processes

Sara Seager



“This book will be a bible for students and professionals interested in exoplanet atmospheres.”  
—Edwin L. Turner,  
Princeton University

*Princeton Series in Astrophysics*

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91 line illus. 8 tables.

Pa: 978-0-691-14645-4 \$45.00 | £30.95  
Cl: 978-0-691-11914-4 \$89.50 | £62.00

## Geochemical Kinetics

Youxue Zhang

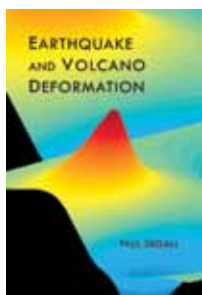


“This is the most comprehensive, authoritative account of geochemical kinetics published to date.”  
—*Choice*

2008. 664 pages. 5 halftones.  
141 line illus.  
Cl: 978-0-691-12432-2  
\$75.00 | £52.00

## Earthquake and Volcano Deformation

Paul Segall



“This excellent and timely book presents and develops models for earth deformations.”

—John W. Rudnicki,  
Northwestern University

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## Physics and Technology for Future Presidents

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Richard A. Muller

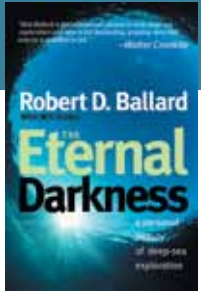
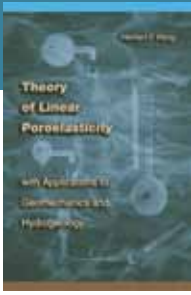


“To make wise decisions, not only future presidents, but future business and community leaders, and thoughtful citizens generally, need the information in this book.”  
—Frank Wilczek, Nobel Prize-winning physicist

2010. 536 pages. 136 color illus. 13 tables.  
Cl: 978-0-691-13504-5 \$65.00 | £44.95

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Honorable Mention, 2008 PROSE Award for Excellence in Earth Science, Association of American Publishers

## How the Ocean Works

An Introduction to Oceanography

**Mark Denny**

2008. 344 pages. 148 color illus. 7 tables.

Pa: 978-0-691-12647-0 \$59.50 | £41.95

*Not for sale in South Asia*

## Ocean Biogeochemical Dynamics

**Jorge L. Sarmiento & Nicolas Gruber**

2006. 528 pages. 8 color plates. 102 halftones. 178 line illus. 62 tables.

Cl: 978-0-691-01707-5 \$90.00 | £62.00

## Geochemistry of Marine Sediments

**David J. Burdige**

2006. 624 pages. 33 halftones. 75 line illus. 33 tables.

Cl: 978-0-691-09506-6 \$90.00 | £62.00

Second Edition

## Aquatic Photosynthesis

**Paul G. Falkowski & John A. Raven**

2007. 512 pages. 8 color plates. 10 halftones. 145 line illus. 22 tables.

Pa: 978-0-691-11551-1 \$65.00 | £44.95

Cl: 978-0-691-11550-4 \$125.00 | £85.00

## Fundamentals of Ocean Climate Models

**Stephen Griffies**

2004. 552 pages. 40 line illus. 1 table.

Cl: 978-0-691-11892-5 \$82.50 | £57.50

With a foreword by Edward N. Lorenz

## The Global Circulation of the Atmosphere

**Edited by Tapio Schneider & Adam H. Sobel**

2007. 400 pages. 140 halftones.

Cl: 978-0-691-12181-9 \$82.50 | £57.50

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Effects of Human Activity

**Michael B. McElroy**

2002. 352 pages. 8 color illus. 288 line illus.

Cl: 978-0-691-00691-8 \$95.00 | £65.00

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**Daniel J. Jacob**

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Cl: 978-0-691-00185-2 \$78.50 | £55.00

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**Robert L. Parker**

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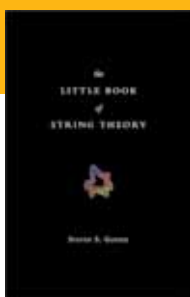
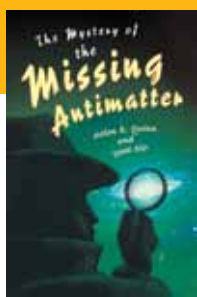
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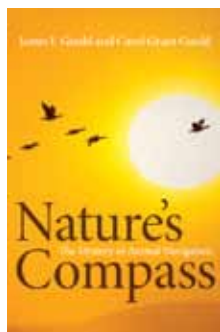
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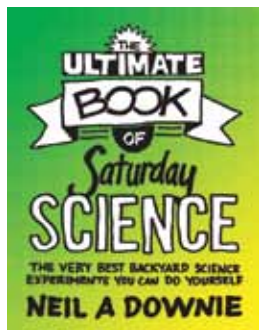
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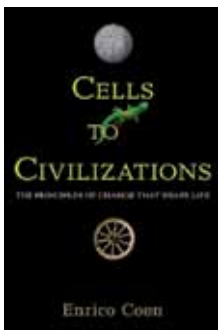
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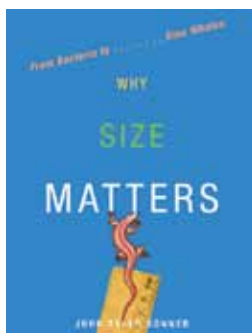
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