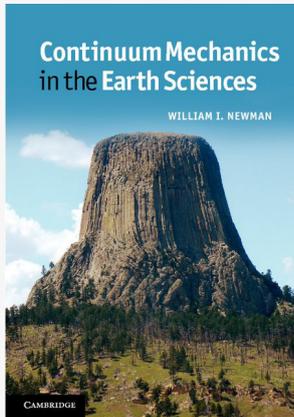




Continuum Mechanics in the Earth Sciences



By William I. Newman

CAMBRIDGE UNIVERSITY PRESS

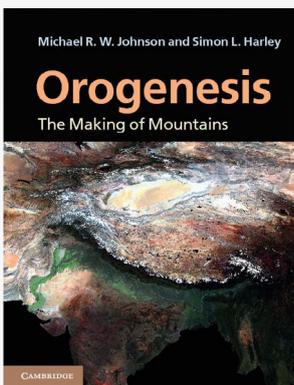
194 pages | Hardback
1st edition | March 2012
ISBN 978-0-52-156289-8

Price: £40.00 (~€50.00)

Publisher's summary

Continuum mechanics underlies many geological and geophysical phenomena, from earthquakes and faults to the fluid dynamics of the Earth. This interdisciplinary book provides geoscientists, physicists and applied mathematicians with a class-tested, accessible overview of continuum mechanics. Starting from thermodynamic principles and geometrical insights, the book surveys solid, fluid and gas dynamics. In later review chapters, it explores new aspects of the field emerging from nonlinearity and dynamical complexity and provides a brief introduction to computational modeling. Simple, yet rigorous, derivations are used to review the essential mathematics. The author emphasizes the full three-dimensional geometries of real-world examples, enabling students to apply this in deconstructing solid earth and planet-related problems. Problem sets and worked examples are provided, making this a practical resource for graduate students in geophysics, planetary physics and geology and a beneficial tool for professional scientists seeking a better understanding of the mathematics and physics within Earth sciences.

Orogenesis: The Making of Mountains



By Michael R. W. Johnson and Simon L. Harley

CAMBRIDGE UNIVERSITY PRESS

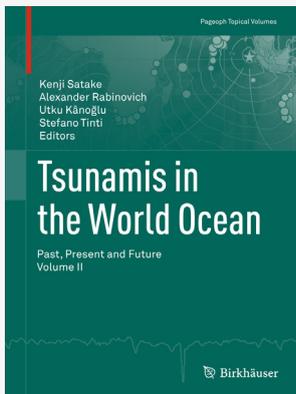
398 pages | Hardback
1st edition | March 2012
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Price: £45.00 (~€55.00)

Publisher's summary

Orogenesis, the process of mountain building, occurs when two tectonic plates collide – either forcing material upwards to form mountain belts such as the Alps or Himalayas or causing one plate to be subducted below the other, resulting in volcanic mountain chains such as the Andes. Integrating the approaches of structural geology and metamorphism, this book provides an up-to-date overview of orogenic research and an introduction to the physico-chemical properties of mountain belts. Global examples are explored, the interacting roles of temperature and deformation in the orogenic process are reviewed, and important new concepts such as channel flow are explained. This book provides a valuable introduction to this fast-moving field for advanced undergraduate and graduate students of structural geology, plate tectonics and geodynamics, and will also provide a vital overview of research for academics and researchers working in related fields including petrology geochemistry and sedimentology.

Tsunamis in the World Ocean: Past, Present and Future, Volume II



Edited by K. Satake, U. Kânoğlu, and S. Tinti

SPRINGER

233 pages | Softcover
1st edition | January 2012
ISBN 978-3-0348-0233-8

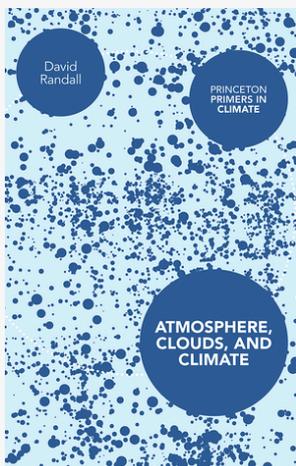
Price: € 53.45

Publisher's summary

The tsunami from the 1960 Chilean earthquake affected the entire Pacific Ocean and motivated the international coordination of tsunami research and warning systems around the Pacific. However, the 2004 Indian Ocean tsunami affected the entire world, and reminded that tsunamis are not a local or regional problem but a global issue.

This volume contains 15 papers, mostly presented at the 24th International Tsunami Symposium held on 14–16 July 2009 in Novosibirsk, Russia. They reflect the current state of tsunami science, including studies of recent tsunamis, tsunami statistics and warning, and modeling tsunami runup and inundation.

Atmosphere, Clouds, and Climate



By David Randall

PRINCETON UNIVERSITY PRESS

288 pages | Paperback
1st edition | May 2012
ISBN 978-0-69-114375-0

Price: £23.99 (~€30.00)

Publisher's summary

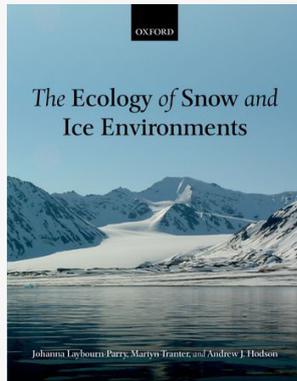
The atmosphere is critical to climate change. It can amplify shifts in the climate system, and also mitigate them. This primer offers a short, reader-friendly introduction to these atmospheric processes and how they work, written by a leading expert on the subject.

Giving readers an overview of key atmospheric processes, David Randall looks at how our climate system receives energy from the sun and sheds it by emitting infrared radiation back into space. The atmosphere regulates these radiative energy flows and transports energy through weather systems such as thunderstorms, monsoons, hurricanes, and winter storms. Randall explains how these processes work, and also how precipitation, cloud formation, and other phase changes of water strongly influence weather and climate. He discusses how atmospheric feedbacks affect climate change, how the large-scale atmospheric circulation works, how predicting the weather and the climate are fundamentally different challenges, and much more. This is the ideal introduction for students and nonspecialists. No prior experience in atmospheric science is needed, only basic college physics.

Authoritative and concise, Atmosphere, Clouds, and Climate features a glossary of terms, suggestions for further reading, and easy-to-follow explanations of a few key equations. This accessible primer is the essential introduction to atmospheric processes and the vital role they play in our climate system.

The Ecology of Snow and Ice Environments

A review of a new book by three UK geoscientists



By Johanna Laybourn-Parry,
Martyn Tranter, and Andrew
J. Hodson

OXFORD UNIVERSITY
PRESS

192 pages | Paperback
1st edition | February 2012
ISBN 978-0-19-958308-9

Price: £32.50 (~€40.00)

On a first and superficial glimpse a landscape covered by ice and snow appears barren and devoid of life. But if you study more carefully the pockets of liquid water forming on, in, or below this cover, a fascinating microcosm emerges. An extreme environment, characterized by low temperatures, low nutrient content, reduced or increased solar irradiance (depending of thickness and the albedo of snow), sudden changes in salinity, pH, or water chemistry – a world inhabited mostly by microorganisms with peculiar adaptations to survive and thrive. Until now, a guide to this world was lacking and research on the subject was scattered in many scientific publications, hard to access by those not directly involved in the topic.

The Ecology of Snow and Ice Environments by polar researchers and geographers J. Laybourn-Parry, M. Tranter, and A. J. Hodson, tries to bridge this gap by providing a short (142 pages of text with black & white images, plus an inlet with colour plates) but well documented textbook, discussing the many aspects of ice and snow as a base of an ecosystem.

The book is divided into seven main chapters, dealing with specific cold habitats or discussing recent and future research. The first chapter introduces the basic physical and chemical properties of

snow and ice, which on Earth are found in the form of superficial snow cover, glaciers, sea/lake ice, ice caps, and ice fields. The following four chapters cover these environments more specifically, citing research done from the mountain glaciers of middle latitudes to the ice caps of the poles. These environments are subdivided into more specific habitats, like cryoconites – pools of liquid water forming on the surface of melting glaciers, or brine channels – a network of water with high salt concentration forming during freezing of sea-water, or subglacial lakes. The latter are especially interesting after the announcement this year that a Russian drilling project reached Lake Vostok, a lake buried under the Antarctic ice cap and possibly an ecosystem that remained isolated for millions of years.

Chapter six is dedicated to astrobiology and discusses whether these extreme, but earth-bound ecosystems can be used as models of inference towards possible extraterrestrial habitats and life forms on other worlds, like the icy moons of Jupiter or Saturn. Finally, the last chapter proposes possible future research directions, especially the use of remote-sensing technology or molecular analysis to understand the geographic distribution and evolution of the ‘ice-loving’ organisms.

The book is mainly addressed to glaciologists, microbiologists or ecologists, but the introductory chapter and a short glossary provide basic definitions of terms used, enabling also non-glaciologist/biologists to follow the explanations and argumentations of later chapters.

There is only one minor point for criticism with this book: as the authors admit already in the preface, they don't discuss the ecology of frozen soils or permafrost. Considering the possible effects of increased microbial activity and release of greenhouse gases from warming soils, this would make for a timely and valuable additional chapter in future editions.

David Bressan, freelance geologist based in Italy

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