

Ocean Biogeochemical Dynamics

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Marine Ecosystems and Global Change - John G. Field 2010-02-11

Global changes, including climate change and intensive fishing, are having significant impacts on the world's oceans. This book advances knowledge of the structure and functioning of marine ecosystems and their major sub-systems, and how they respond to physical forcing.

Biogeochemical Cycles in Globalization and Sustainable Development - Vladimir F. Krapivin 2008-08-21

This book presents a new approach to the study of global environmental changes that have unfavorable implications for people and other living systems. The book benefits from the accumulation of knowledge from different sciences. Basic global problems of the nature-society system dynamics are considered. The book aims to develop a universal information technology to estimate the state of environmental subsystems functioning under various climatic and anthropogenic conditions.

Nitrogen in the Marine Environment - Edward J. Carpenter 2016-10-27

Nitrogen in the Marine Environment provides information pertinent to the many aspects of the nitrogen cycle. This book presents the advances in ocean productivity research, with emphasis on the role of microbes in nitrogen transformations with excursions to higher trophic levels.

Organized into 24 chapters, this book begins with an overview of the abundance and distribution of the various forms of nitrogen in a number of estuaries. This text then provides a comparison of the nitrogen cycling of various ecosystems within the marine environment. Other chapters consider chemical distributions and methodology as an aid to those entering the field. This book discusses as well the enzymology of the initial steps of inorganic nitrogen assimilation. The final chapter deals with the philosophy and application of modeling as an investigative method in basic research on nitrogen dynamics in coastal and open-ocean marine environments. This book is a valuable resource for plant biochemists, microbiologists, aquatic ecologists, and bacteriologists.

Ocean Biogeochemistry - Michael J.R. Fasham 2012-12-06

Oceans account for 50% of the anthropogenic CO₂ released into the atmosphere. During the past 15 years an international programme, the Joint Global Ocean Flux Study (JGOFS), has been studying the ocean carbon cycle to quantify and model the biological and physical processes whereby CO₂ is pumped from the ocean's surface to the depths of the ocean, where it can remain for hundreds of years. This project is one of the largest multi-disciplinary studies of the oceans ever carried out and this book synthesises the results. It covers all aspects of the topic ranging from air-sea exchange with CO₂, the role of physical mixing, the uptake of CO₂ by marine algae, the fluxes of carbon and nitrogen through the marine food chain to the subsequent export of carbon to the depths of the ocean. Special emphasis is laid on predicting future climatic change.

The Global Carbon Cycle - Martin Heimann 2013-06-29

This book is the outcome of a NAill Advanced Study Institute on the contemporary global carbon cycle, held in n Ciocco, Italy, September 8-20, 1991. The motivation for this ASI originated from recent controversial findings regarding the relative roles of the ocean and the land biota in the current global balance of atmospheric carbon dioxide. Consequently, the pur pose of this institute was to review, among leading experts in the field, the multitude of known constraints on the present day global carbon cycle as identified by the fields of meteorology, physical and biological oceanography, geology and terrestrial biosphere sciences. At the same time the form of an Advanced Study Institute was chosen, thus providing the opportunity to convey the information in tutorial form across disciplines and to young researchers entering the field. The first three sections of this book contain the lectures held in II Ciocco. The first section reviews the atmospheric, large-scale global constraints on the present day carbon cycle including the emissions of carbon dioxide from fossil fuel use and it provides a brief look into the

past. The second section discusses the role of the terrestrial biosphere and the third the role of the ocean in the contemporary global carbon cycle.

Ocean Biogeochemical Dynamics - Jorge L. Sarmiento 2013-07-17

Ocean Biogeochemical Dynamics provides a broad theoretical framework upon which graduate students and upper-level undergraduates can formulate an understanding of the processes that control the mean concentration and distribution of biologically utilized elements and compounds in the ocean. Though it is written as a textbook, it will also be of interest to more advanced scientists as a wide-ranging synthesis of our present understanding of ocean biogeochemical processes. The first two chapters of the book provide an introductory overview of biogeochemical and physical oceanography. The next four chapters concentrate on processes at the air-sea interface, the production of organic matter in the upper ocean, the remineralization of organic matter in the water column, and the processing of organic matter in the sediments. The focus of these chapters is on analyzing the cycles of organic carbon, oxygen, and nutrients. The next three chapters round out the authors' coverage of ocean biogeochemical cycles with discussions of silica, dissolved inorganic carbon and alkalinity, and CaCO₃. The final chapter discusses applications of ocean biogeochemistry to our understanding of the role of the ocean carbon cycle in interannual to decadal variability, paleoclimatology, and the anthropogenic carbon budget. The problem sets included at the end of each chapter encourage students to ask critical questions in this exciting new field. While much of the approach is mathematical, the math is at a level that should be accessible to students with a year or two of college level mathematics and/or physics.

Phytoplankton Pigments - Suzanne Roy 2011-10-27

Pigments act as tracers to elucidate the fate of phytoplankton in the world's oceans and are often associated with important biogeochemical cycles related to carbon dynamics in the oceans. They are increasingly used in in situ and remote-sensing applications, detecting algal biomass and major taxa through changes in water colour. This book is a follow-up to the 1997 volume *Phytoplankton Pigments in Oceanography* (UNESCO Press). Since then, there have been many advances concerning phytoplankton pigments. This book includes recent discoveries on several new algal classes particularly for the picoplankton, and on new pigments. It also includes many advances in methodologies, including liquid chromatography-mass spectrometry (LC-MS) and developments and updates on the mathematical methods used to exploit pigment information and extract the composition of phytoplankton communities. The book is invaluable primarily as a reference for students, researchers and professionals in aquatic science, biogeochemistry and remote sensing.

Coastal Wetlands - Gerardo M.E. Perillo 2009-01-18

Coastal wetlands are under a great deal of pressure from the dual forces of rising sea level and the intervention of human populations both along the estuary and in the river catchment. Direct impacts include the destruction or degradation of wetlands from land reclamation and infrastructures. Indirect impacts derive from the discharge of pollutants, changes in river flows and sediment supplies, land clearing, and dam operations. As sea level rises, coastal wetlands in most areas of the world migrate landward to occupy former uplands. The competition of these lands from human development is intensifying, making the landward migration impossible in many cases. This book provides an understanding of the functioning of coastal ecosystems and the ecological services that they provide, and suggestions for their management. In this book a CD is included containing color figures of wetlands and estuaries in different parts of the world. * Includes a CD containing color figures of wetlands and estuaries in different parts of the world.

An Introduction to the Chemistry of the Sea - Michael E. Q. Pilson 2013
An engaging introduction to marine chemistry and the ocean's

geochemical interactions with the solid earth and atmosphere, for students of oceanography.

The Biogeochemical Cycle of Silicon in the Ocean - Bernard Quéguiner
2016-06-20

In the biogeochemical dynamics of marine ecosystems, silicon is a major element whose role has, for a long time, been underestimated. It is however indispensable to the activity of several biomineralizing marine organisms, some of which play an essential role in the biological pump of oceanic carbon. This book presents notions indispensable to the knowledge on the silicon biogeochemical cycle in ocean systems, first of all describing the main quantitative analysis techniques and examination of the major organisms involved in the cycle. The author then moves on to study the most up-to-date processes to control the use of silicon and its regeneration in natural conditions, before mentioning the central role played by this original element in the control of all the biogeochemical cycles in the global ocean. The available information finally enables the global biogeochemical budget of silicon in the marine environment to be quantified.

A Place Like No Other - Anthony R. E. Sinclair 2021-10-19

"With its biodiversity, astounding megafauna, and great animal migrations, the Serengeti is like no other ecosystem in Africa or indeed the world. It is also one of the most well studied places and perhaps no scientist has contributed more to our understanding of the Serengeti than Tony Sinclair, who has been researching this region since 1965. In this book, Sinclair recounts his quest to understand how the Serengeti works and what this unique place can tell us about how other ecosystems work and how they might even be repaired"--

Biogeochemical Dynamics at Major River-Coastal Interfaces - Thomas Bianchi 2014

A comprehensive, state-of-the-art synthesis of biogeochemical dynamics and the impact of human alterations at major river-coastal interfaces for advanced students and researchers.

Global Biogeochemical Cycles in the Climate System - Ernst-Detlef Schulze 2001-08-10

The interactions of biogeochemical cycles influence and maintain our climate system. Land use and fossil fuel emissions are currently impacting the biogeochemical cycles of carbon, nitrogen and sulfur on land, in the atmosphere, and in the oceans. This edited volume brings together 27 scholarly contributions on the state of our knowledge of earth system interactions among the oceans, land, and atmosphere. A unique feature of this treatment is the focus on the paleoclimatic and paleobiotic context for investigating these complex interrelationships. * Eight-page colour insert to highlight the latest research * A unique feature of this treatment is the focus on the paleoclimatic context for investigating these complex interrelationships.

Ocean Mixing - Michael Meredith 2021-09-16

Ocean Mixing: Drivers, Mechanisms and Impacts presents a broad panorama of one of the most rapidly-developing areas of marine science. It highlights the state-of-the-art concerning knowledge of the causes of ocean mixing, and a perspective on the implications for ocean circulation, climate, biogeochemistry and the marine ecosystem. This edited volume places a particular emphasis on elucidating the key future questions relating to ocean mixing, and emerging ideas and activities to address them, including innovative technology developments and advances in methodology. Ocean Mixing is a key reference for those entering the field, and for those seeking a comprehensive overview of how the key current issues are being addressed and what the priorities for future research are. Each chapter is written by established leaders in ocean mixing research; the volume is thus suitable for those seeking specific detailed information on sub-topics, as well as those seeking a broad synopsis of current understanding. It provides useful ammunition for those pursuing funding for specific future research campaigns, by being an authoritative source concerning key scientific goals in the short, medium and long term. Additionally, the chapters contain bespoke and informative graphics that can be used in teaching and science communication to convey the complex concepts and phenomena in easily accessible ways. • Presents a coherent overview of the state-of-the-art research concerning ocean mixing • Provides an in-depth discussion of how ocean mixing impacts all scales of the planetary system • Includes elucidation of the grand challenges in ocean mixing, and how they might be addressed

Estuarine Biogeochemical Dynamics of the East Coast of India - Sourav Das 2021-04-15

This book provides a comprehensive overview of recent research on estuaries of the east coast of India, and how changing biogeochemical

dynamics as a result of climate change and human activity have impacted estuaries and other open water ecosystems. Though estuaries only cover a very small portion of the earth's hydrosphere, they are some of the most biogeochemically active regions among the global water bodies. As such, this book focuses on estuaries of the east coast of India going all the way to the Bay of Bengal, which is the world's largest freshwater input from perennial rivers and rain-fed estuaries, and is therefore a unique area of study. Through its unique coverage of the Bay of Bengal in particular, the book presents a new perspective not present in the literature on estuary biogeochemistry and ecosystem dynamics.

Moreover, the book addresses SDG 13 (Climate Action) and 14 (Life below Water), with a focus on ecosystem services of the natural aquatic system. The book will be useful to researchers, policy makers, coastal managers and marine sustainability scientists and organizations.

The Chemistry of the Atmosphere and Oceans - Heinrich D. Holland 1978
New York : Wiley, c1978.

CO₂ in Seawater: Equilibrium, Kinetics, Isotopes - R.E. Zeebe
2001-10-15

Carbon dioxide is the most important greenhouse gas after water vapor in the atmosphere of the earth. More than 98% of the carbon of the atmosphere-ocean system is stored in the oceans as dissolved inorganic carbon. The key for understanding critical processes of the marine carbon cycle is a sound knowledge of the seawater carbonate chemistry, including equilibrium and nonequilibrium properties as well as stable isotope fractionation. Presenting the first coherent text describing equilibrium and nonequilibrium properties and stable isotope fractionation among the elements of the carbonate system. This volume presents an overview and a synthesis of these subjects which should be useful for graduate students and researchers in various fields such as biogeochemistry, chemical oceanography, paleoceanography, marine biology, marine chemistry, marine geology, and others. The volume includes an introduction to the equilibrium properties of the carbonate system in which basic concepts such as equilibrium constants, alkalinity, pH scales, and buffering are discussed. It also deals with the nonequilibrium properties of the seawater carbonate chemistry. Whereas principle of chemical kinetics are recapitulated, reaction rates and relaxation times of the carbonate system are considered in details. The book also provides a general introduction to stable isotope fractionation and describes the partitioning of carbon, oxygen, and boron isotopes between the species of the carbonate system. The appendix contains formulas for the equilibrium constants of the carbonate system, mathematical expressions to calculate carbonate system parameters, answers to exercises and more.

Marine Carbon Biogeochemistry - Jack J. Middelburg 2019-01-25

This open access book discusses biogeochemical processes relevant to carbon and aims to provide readers, graduate students and researchers, with insight into the functioning of marine ecosystems. A carbon centric approach has been adopted, but other elements are included where relevant or needed. The book focuses on concepts and quantitative understanding of primary production, organic matter mineralization and sediment biogeochemistry. The impact of biogeochemical processes on inorganic carbon dynamics and organic matter transformation are also discussed.

Chemical Oceanography and the Marine Carbon Cycle - Steven Emerson
2008-04-24

The principles of chemical oceanography provide insight into the processes regulating the marine carbon cycle. The text offers a background in chemical oceanography and a description of how chemical elements in seawater and ocean sediments are used as tracers of physical, biological, chemical and geological processes in the ocean. The first seven chapters present basic topics of thermodynamics, isotope systematics and carbonate chemistry, and explain the influence of life on ocean chemistry and how it has evolved in the recent (glacial-interglacial) past. This is followed by topics essential to understanding the carbon cycle, including organic geochemistry, air-sea gas exchange, diffusion and reaction kinetics, the marine and atmosphere carbon cycle and diagenesis in marine sediments. Figures are available to download from www.cambridge.org/9780521833134. Ideal as a textbook for upper-level undergraduates and graduates in oceanography, environmental chemistry, geochemistry and earth science and a valuable reference for researchers in oceanography.

Dynamics of Marine Ecosystems - K. H. Mann 2013-04-16

The new edition of this widely respected text provides comprehensive and up-to-date coverage of the effects of biological-physical interactions in the oceans from the microscopic to the global scale. considers the

influence of physical forcing on biological processes in a wide range of marine habitats including coastal estuaries, shelf-break fronts, major ocean gyres, coral reefs, coastal upwelling areas, and the equatorial upwelling system investigates recent significant developments in this rapidly advancing field includes new research suggesting that long-term variability in the global atmospheric circulation affects the circulation of ocean basins, which in turn brings about major changes in fish stocks. This discovery opens up the exciting possibility of being able to predict major changes in global fish stocks written in an accessible, lucid style, this textbook is essential reading for upper-level undergraduates and graduate students studying marine ecology and biological oceanography

Great Adaptations - Kenneth Catania 2020-09-15

Presents an entertaining and engaging look at some of nature's most remarkable creatures ... Shows not only how studying these animals can provide deep insights into how life evolved, but also how scientific discovery can be filled with adventure and fun--Adapted from cover.

The Mediterranean Sea in the Era of Global Change 1 - Christophe Migon 2020-02-19

Due to its particular characteristics, the Mediterranean Sea is often viewed as a microcosm of the World Ocean. Its proportionally-reduced dimensions and peculiar hydrological circulation render it susceptible to environmental and climatic constraints, which are rapidly evolving. The Mediterranean is therefore an ideal site to examine, in order to better understand a number of key oceanographic phenomena. This is especially true of the Ligurian Sea where, due to its geology, oceanic conditions are found close to the coast. As such, 30 years ago, an offshore time-series site provided a fresh impetus to a long history of marine biology research, which has generated a very important body of data and knowledge. This is the first volume, in a two-volume series, that summarizes this research. Across these two books, the reader will find 13 chapters that examine the geology, physics, chemistry and biology of the Ligurian Sea ? always with the goal of providing key elements of oceanography in a changing world.

Biogeochemistry of Marine Dissolved Organic Matter - Dennis A. Hansell 2014-10-02

Marine dissolved organic matter (DOM) is a complex mixture of molecules found throughout the world's oceans. It plays a key role in the export, distribution, and sequestration of carbon in the oceanic water column, posited to be a source of atmospheric climate regulation.

Biogeochemistry of Marine Dissolved Organic Matter, Second Edition, focuses on the chemical constituents of DOM and its biogeochemical, biological, and ecological significance in the global ocean, and provides a single, unique source for the references, information, and informed judgments of the community of marine biogeochemists. Presented by some of the world's leading scientists, this revised edition reports on the major advances in this area and includes new chapters covering the role of DOM in ancient ocean carbon cycles, the long term stability of marine DOM, the biophysical dynamics of DOM, fluvial DOM qualities and fate, and the Mediterranean Sea. *Biogeochemistry of Marine Dissolved Organic Matter, Second Edition*, is an extremely useful resource that helps people interested in the largest pool of active carbon on the planet (DOC) get a firm grounding on the general paradigms and many of the relevant references on this topic. Features up-to-date knowledge of DOM, including five new chapters The only published work to synthesize recent research on dissolved organic carbon in the Mediterranean Sea Includes chapters that address inputs from freshwater terrestrial DOM

Atmosphere, Ocean and Climate Dynamics - John Marshall 2007-12-19

For advanced undergraduate and beginning graduate students in atmospheric, oceanic, and climate science, *Atmosphere, Ocean and Climate Dynamics* is an introductory textbook on the circulations of the atmosphere and ocean and their interaction, with an emphasis on global scales. It will give students a good grasp of what the atmosphere and oceans look like on the large-scale and why they look that way. The role of the oceans in climate and paleoclimate is also discussed. The combination of observations, theory and accompanying illustrative laboratory experiments sets this text apart by making it accessible to students with no prior training in meteorology or oceanography. *

Written at a mathematical level that is appealing for undergraduates and beginning graduate students * Provides a useful educational tool through a combination of observations and laboratory demonstrations which can be viewed over the web * Contains instructions on how to reproduce the simple but informative laboratory experiments * Includes copious problems (with sample answers) to help students learn the material.

The Secret Body - Daniel M. Davis 2022-07-26

"A perfect blend of cutting-edge science and compelling storytelling."—Bill Bryson A revolutionary new vision of human biology and the scientific breakthroughs that will transform our lives Imagine knowing years in advance whether you are likely to get cancer or having a personalized understanding of your individual genes, organs, and cells. Imagine being able to monitor your body's well-being, or have a diet tailored to your microbiome. The Secret Body reveals how these and other stunning breakthroughs and technologies are transforming our understanding of how the human body works, what it is capable of, how to protect it from disease, and how we might manipulate it in the future. Taking readers to the cutting edge of research, Daniel Davis shows how radical new possibilities are becoming realities thanks to the visionary efforts of scientists who are revealing the invisible and secret universe within each of us. Focusing on six important frontiers, Davis describes what we are learning about cells, the development of the fetus, the body's immune system, the brain, the microbiome, and the genome—areas of human biology that are usually understood in isolation. Bringing them together here for the first time, Davis offers a new vision of the human body as a biological wonder of dizzying complexity and possibility. Written by an award-winning scientist at the forefront of this adventure, *The Secret Body* is a gripping drama of discovery and a landmark account of the dawning revolution in human health.

Biogeochemistry of Estuaries - Thomas S. Bianchi 2007

Offering a comprehensive and interdisciplinary approach to the study of biochemical cycling in estuaries, this text utilizes numerous illustrations and an extensive literature base in order to impart the current state-of-the-art knowledge in the field.

Stable Isotope Ecology - Brian Fry 2007-01-15

A solid introduction to stable isotopes that can also be used as an instructive review for more experienced researchers and professionals. The book approaches the use of isotopes from the perspective of ecological and biological research, but its concepts can be applied within other disciplines. A novel, step-by-step spreadsheet modeling approach is also presented for circulating tracers in any ecological system, including any favorite system an ecologist might dream up while sitting at a computer. The author's humorous and lighthearted style painlessly imparts the principles of isotope ecology. The online material contains color illustrations, spreadsheet models, technical appendices, and problems and answers.

Biogeochemistry - W.H. Schlesinger 2013-01-14

For the past 4 billion years, the chemistry of the Earth's surface, where all life exists, has changed remarkably. Historically, these changes have occurred slowly enough to allow life to adapt and evolve. In more recent times, the chemistry of the Earth is being altered at a staggering rate, fueled by industrialization and an ever-growing human population. Human activities, from the rapid consumption of resources to the destruction of the rainforests and the expansion of smog-covered cities, are all leading to rapid changes in the basic chemistry of the Earth. The Third Edition of *Biogeochemistry* considers the effects of life on the Earth's chemistry on a global level. This expansive text employs current technology to help students extrapolate small-scale examples to the global level, and also discusses the instrumentation being used by NASA and its role in studies of global change. With the Earth's changing chemistry as the focus, this text pulls together the many disparate fields that are encompassed by the broad reach of biogeochemistry. With extensive cross-referencing of chapters, figures, and tables, and an interdisciplinary coverage of the topic at hand, this text will provide an excellent framework for courses examining global change and environmental chemistry, and will also be a useful self-study guide.

Emphasizes the effects of life on the basic chemistry of the atmosphere, the soils, and seawaters of the Earth Calculates and compares the effects of industrial emissions, land clearing, agriculture, and rising population on Earth's chemistry Synthesizes the global cycles of carbon, nitrogen, phosphorous, and sulfur, and suggests the best current budgets for atmospheric gases such as ammonia, nitrous oxide, dimethyl sulfide, and carbonyl sulfide Includes an extensive review and up-to-date synthesis of the current literature on the Earth's biogeochemistry.

Deep Carbon - Beth N. Orcutt 2019-10-17

A comprehensive guide to carbon inside Earth - its quantities, movements, forms, origins, changes over time and impact on planetary processes. This title is also available as Open Access on Cambridge Core.

A History of Biology - Michel Morange 2021-06-01

A comprehensive history of the biological sciences from antiquity to the modern era This book presents a global history of the biological sciences from ancient times to today, providing needed perspective on the

development of biological thought while shedding light on the field's upheavals and key breakthroughs through the ages. Michel Morange brings to life the dynamic interplay of science, society, and biology's many subdisciplines, enabling readers to better appreciate the interdisciplinary exchanges that have shaped the field over the centuries. Each chapter of this incisive book focuses on a specific period in the history of biology, describing the major transformations that occurred, the enduring scientific concerns behind these changes, and the implications of yesterday's science for today's. Morange covers everything from the first cell theory to the origins of the concept of ecosystems, and offers perspectives on areas that are often neglected by historians of biology, such as ecology, ethology, and plant biology. Along the way, he highlights the contributions of technology, the important role of hypothesis and experimentation, and the cultural contexts in which some of the most breathtaking discoveries in biology were made. Unrivaled in scope and written by a world-renowned historian of science, *A History of Biology* is an ideal introduction for students and experts alike, and essential reading for anyone seeking to understand the present state of biological knowledge.

Congo Basin Hydrology, Climate, and Biogeochemistry - Raphael M. Tshimanga 2022-02-08

New scientific discoveries in the Congo Basin as a result of international collaborations The Congo is the world's second largest river basin and home to 120 million people. Understanding the cycling of water, sediments, and nutrients is important as the region faces climatic and anthropogenic change. *Congo Basin Hydrology, Climate, and Biogeochemistry: A Foundation for the Future* explores variations in and influences on rainfall, hydrology and hydraulics, and sediment and carbon dynamics. It features contributions from experts in the region and their international collaborators. Volume highlights include: New in-situ and remotely sensed measurements and model results Use of historic data to assess precipitation and hydrologic changes Exploration of water exchange between wetlands and rivers Biogeochemical processes in the Congo's forests and wetlands A scientific foundation for hydrologic resource management in the region Studies from different parts of the Congo river and its adjoining basins This book is available in English and French. The American Geophysical Union promotes discovery in Earth and space science for the benefit of humanity. Its publications disseminate scientific knowledge and provide resources for researchers, students, and professionals.

Ocean Biogeochemical Dynamics - Jorge L. Sarmiento 2006-06-09

Ocean Biogeochemical Dynamics provides a broad theoretical framework upon which graduate students and upper-level undergraduates can formulate an understanding of the processes that control the mean concentration and distribution of biologically utilized elements and compounds in the ocean. Though it is written as a textbook, it will also be of interest to more advanced scientists as a wide-ranging synthesis of our present understanding of ocean biogeochemical processes. The first two chapters of the book provide an introductory overview of biogeochemical and physical oceanography. The next four chapters concentrate on processes at the air-sea interface, the production of organic matter in the upper ocean, the remineralization of organic matter in the water column, and the processing of organic matter in the sediments. The focus of these chapters is on analyzing the cycles of organic carbon, oxygen, and nutrients. The next three chapters round out the authors' coverage of ocean biogeochemical cycles with discussions of silica, dissolved inorganic carbon and alkalinity, and CaCO_3 . The final chapter discusses applications of ocean biogeochemistry to our understanding of the role of the ocean carbon cycle in interannual to decadal variability, paleoclimatology, and the anthropogenic carbon budget. The problem sets included at the end of each chapter encourage students to ask critical questions in this exciting new field. While much of the approach is mathematical, the math is at a level that should be accessible to students with a year or two of college level mathematics and/or physics.

Particle Analysis in Oceanography - Serge Demers 2013-06-29

Individual cell and particle analysis in aquatic sciences is involved in many aspects of oceanography and limnology, including optical physics of particles, phytoplankton physiology and ecology, marine and aquatic microbiology and food web interactions. This book concentrates on the optimal utilization of flow cytometry and image analysis and the ways in which oceanographic and limnological problems can be uniquely or better addressed using these techniques.

Ocean Dynamics and the Carbon Cycle - Richard G. Williams 2011-07-14

This textbook for advanced undergraduate and graduate students presents a multidisciplinary approach to understanding ocean circulation

and how it drives and controls marine biogeochemistry and biological productivity at a global scale. Background chapters on ocean physics, chemistry and biology provide students with the tools to examine the range of large-scale physical and dynamic phenomena that control the ocean carbon cycle and its interaction with the atmosphere. Throughout the text observational data is integrated with basic physical theory to address cutting-edge research questions in ocean biogeochemistry. Simple theoretical models, data plots and schematic illustrations summarise key results and connect the physical theory to real observations. Advanced mathematics is provided in boxes and appendices where it can be drawn on to assist with the worked examples and homework exercises available online. Further reading lists for each chapter and a comprehensive glossary provide students and instructors with a complete learning package.

Carbon and Nutrient Fluxes in Continental Margins - Kon-Keo Liu 2010-02-11

This book is a product of the joint JGOFS (Joint Global Ocean Flux Study)/LOICZ (Land-Ocean Interactions in the Coastal Zone) Continental Margins Task Team which was established to facilitate continental margins research in the two projects. It contains significant information on the physical, biogeochemical, and ecosystems of continental margins nationally and regionally and provides a very valuable synthesis of this information and the physical, biogeochemical and ecosystem processes which occur on continental margins. The publication of this book is timely as it provides a very strong foundation for the development of the joint IMBER (Integrated Marine Biogeochemistry and Ecosystems Research)/LOICZ Science Plan and Implementation Strategy for biogeochemical and ecosystems research in the continental margins and the impacts of global change on these systems. This initiative will move forward integrated biogeochemical and ecosystems research in the continental margins. We thank all the contributors to this volume and especially Kon-Keo Liu who has dedicated a great deal of time to ensuring a high-quality book is published. IMBER Scientific Steering Committee Julie Hall LOICZ Scientific Steering Committee Jozef Pacyna v 1 Preface In general, interfaces between the Earth's larger material reservoirs (i. e. , the land, atmosphere, ocean, and sediments) are important in the control of the biogeochemical dynamics and cycling of the major bio-essential elements, including carbon (C), nitrogen (N), phosphorus (P), sulfur (S), and silicon (Si), found in organic matter and the inorganic skeletons, shells, and tests of benthic and marine organisms.

Modeling Methods for Marine Science - David M. Glover 2011-06-02

This advanced textbook on modeling, data analysis and numerical techniques for marine science has been developed from a course taught by the authors for many years at the Woods Hole Oceanographic Institute. The first part covers statistics: singular value decomposition, error propagation, least squares regression, principal component analysis, time series analysis and objective interpolation. The second part deals with modeling techniques: finite differences, stability analysis and optimization. The third part describes case studies of actual ocean models of ever increasing dimensionality and complexity, starting with zero-dimensional models and finishing with three-dimensional general circulation models. Throughout the book hands-on computational examples are introduced using the MATLAB programming language and the principles of scientific visualization are emphasised. Ideal as a textbook for advanced students of oceanography on courses in data analysis and numerical modeling, the book is also an invaluable resource for a broad range of scientists undertaking modeling in chemical, biological, geological and physical oceanography.

Kuroshio Current - Takeyoshi Nagai 2019-05-29

An interdisciplinary study of the Kuroshio nutrient stream The surface water of the Kuroshio, a western boundary current in the North Pacific Ocean, is nutrient-depleted and has relatively low primary productivity, yet abundant fish populations are supported in the region. This is called the "Kuroshio Paradox". *Kuroshio Current: Physical, Biogeochemical and Ecosystem Dynamics* presents research from a multidisciplinary team that conducted observational and modeling studies to investigate this contradiction. This timely and important contribution to the ocean sciences literature provides a comprehensive analysis of the Kuroshio. Volume highlights include: New insights into the role of the Kuroshio as a nutrient stream The first interdisciplinary examination of the Kuroshio Paradox Reflections on the influence of the Kuroshio on Japanese culture Research results on both the lower and higher trophic levels in the Kuroshio ecosystem Comparisons of nutrient dynamics in the Kuroshio and Gulf Stream Predictions of ecosystem responses to future climate

variability

Introduction to the Biogeochemistry of Soils - Ronald Amundson
2021-06-17

The first process-based textbook on how soils form and function in biogeochemical cycles, offering a self-contained and integrated overview of the field as it now stands for advanced undergraduate and graduate students in soil science, environmental science, and the wider Earth sciences. The jargon-free approach quickly familiarises students with the field's theoretical foundations before moving on to analyse chemical and other numerical data, building the necessary skills to develop questions and strategies for original research by the end of a single semester course. The field-based framework equips students with the essential tools for accessing and interpreting the vast USDA soil dataset, allowing them to establish a working knowledge of the most important modern

developments in soil research. Complete with numerous end-of-chapter questions, figures and examples, students will find this textbook a multidisciplinary toolkit invaluable to their future careers.

Global Environment - Elizabeth Kay Berner 2012-04-22

An expanded chapter explores atmospheric chemistry and changing climate, with the most up-to-date statistics on CO₂, the carbon cycle, other greenhouse gases, and the ozone hole.

Physical Oceanography and Climate - Kris Karnauskas 2020-04-02

An engaging and accessible textbook focusing on climate dynamics from the perspective of the ocean, specifically interactions between the atmosphere and ocean. It describes the fundamental physics and dynamics governing the behaviour of the ocean, and provides numerous end-of-chapter questions and access to online data sets.