Stable Isotope Techniques In The Study Of Biological Processes And Functioning Of Ecosystems

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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.

Isotopes in Biology - George Wolf 2013-09-24
Isotope is Biology is a six-chapter supplementary text that covers the properties and application of isotopes as labels or analytical tools in biological research. The first chapters deal with the physico-chemical properties and radioactivity of isotopes. These chapters also explore their synthesis, preparation, radiation decomposition, and decay of radioactivity. The succeeding chapter considers other aspects of isotopes, including their effect of health, disposal, spills, and laboratory use. Another chapter examines the chemical and biochemical behavior, natural abundance, and the chemical stability of isotopic compounds. The final chapters describe several isotopic methods, namely, isotope dilution, paper chromatography, and autoradiography, with emphasis on their application in biological studies. This book will be of value to biologists, and graduate and undergraduate biology students.

Tracking Animal Migration with Stable Isotopes - Keith A. Hobson 2018-09-13
Tracking Animal Migration with Stable Isotopes, Second Edition, provides a complete introduction to new and powerful isotopic tools and applications that track animal migration, reviewing where isotope tracers fit in the modern toolbox of tracking methods. The book provides background information on a broad range of migration scenarios in terrestrial and aquatic systems and summarizes the most cutting-edge developments in the field that are revolutionizing the way migrant individuals and populations are assigned to their true origins. It allows undergraduates, graduate students and non-specialist scientists to adopt and apply isotopes to migration research, and also serves as a useful reference for scientists. The new edition thoroughly updates the information available to the reader on current applications of this technique and provides new tools for the

isotopic assignment of individuals to origins, including geostatistical multi-isotope approaches and the ways in which researchers can combine isotopes with routine data in a Bayesian framework to provide best estimates of animal origins. Four new chapters include contributions on applications to the movements of terrestrial mammals, with particular emphasis on how aspects of animal physiology can influence stable isotope values. Includes an animal physiology component that is an in-depth overview of the cautions and caveats related to this technique Covers marine and aquatic isoscapes and methods to track marine organisms for researchers trying to apply isotopic tracking to animals in these environments Features state-of-the-art statistical treatments for assignment and combining diverse datasets

Stable Isotope Techniques in the Study of Biological Processes and Functioning of Ecosystems - M.J. Unkovich 2013-03-14

In the last two decades technological advances in isotope ratio mass spectrometry have been very rapid, opening up new possibilities for analysis of biological and environmental materials. The new instrumentation has facilitated faster analysis of samples via automated sample preparation and multi-isotope analysis of single samples, resulting in considerable cost savings, and enabling access to isotope analysis for many more researchers. These changes are reflected in the rapidly growing international literature on stable isotopes. While there have been some excellent books and review papers aimed at interpreting isotope signals in biology and environmental science, there have been fewer attempts to provide practical tools for researchers making forays into this exciting new arena. This book aims to address this inadequacy by providing a set of practical guidelines for the application of a range of novel and well proven stable isotope techniques to the fields of plant physiological ecology, agriculture, marine ecology and palaeoecology. The book is the outcome of a weeklong workshop held under the auspices of the Cooperative Research Centre for Legumes in Mediterranean Agriculture (CLIMA 1992 - 2000) at The University of Western Australia and the CSIRO Floreat Laboratories, Perth, Western Australia, in February 1999. The workshop was designed to provide practical tools and experiences for researchers and students concerned with how one goes about using stable isotopes in field investigations.

Using Geochemical Data - Hugh Richard Rollinson 2021-05-06

How best to interpret and apply geochemical data to understand geological processes, for graduate students, researchers, and professionals.

Isotope Tracers in Catchment Hydrology - C. Kendall 2012-12-02

This book represents a new "earth systems" approach to catchments that encompasses the physical and biogeochemical interactions that control the hydrology and biogeochemistry of the system. The text provides a comprehensive treatment of the fundamentals of catchment hydrology, principles of isotope geochemistry, and the isotope variability in the hydrologic cycle -- but the main focus of the book is on case studies in isotope hydrology and isotope geochemistry that explore the applications of isotope techniques for investigating modern environmental problems. Isotope Tracers in Catchment Hydrology is the first synthesis of physical hydrology and isotope geochemistry with catchment focus, and is a valuable reference for professionals and students alike in the fields of hydrology, hydrochemistry, and environmental science. This important interdisciplinary text provides extensive guidelines for the application of isotope techniques for all investigatores facing the challenge of protecting precious water, soil, and ecological resources from the ever-increasing problems associated with population growth and environmental change, including those from urban development and agricultural land uses.

Stable Isotopes and Biosphere - Atmosphere Interactions - Lawrence B Flanagan 2004-12-15

The emerging multidisciplinary field of earth system science sets out to improve our understanding functioning ecosystems, at a global level across the entire planet. Stable Isotopes and Biosphere - Atmosphere Interactions looks to one of its most powerful tools — the application of stable isotope analyses — to understanding biosphere-atmosphere exchange of the greenhouse gases, and

synthesizes much of the recent progress in this work. Stable Isotopes and Biosphere - Atmosphere Interactions describes recent progress in understanding the mechanisms, processes and applications of new techniques. It makes a significant contribution to the emerging, multidisciplinary study of the Earth as an interacting system. This book will be an important reference for students and researchers in biology, ecology, biogeochemistry, meteorology, and atmospheric science and will be invaluable for anyone with any interest in the future of the planet. Describes applications of new stable isotope techniques to the emerging fields of earth system science and global change Illustrates advances in scaling of physiological processes from leaf/soil to the global scale Contains state-of-the-art, critical reviews written by international researchers and experts

Stable Isotopes in Ecology and Environmental Science - Robert Michener 2008-04-15

This book highlights new and emerging uses of stable isotope analysis in a variety of ecological disciplines. While the use of natural abundance isotopes in ecological research is now relatively standard, new techniques and ways of interpreting patterns are developing rapidly. The second edition of this book provides a thorough, up-to-date examination of these methods of research. As part of the Ecological Methods and Concepts series which provides the latest information on experimental techniques in ecology, this book looks at a wide range of techniques that use natural abundance isotopes to: follow whole ecosystem element cycling understand processes of soil organic matter formation follow the movement of water in whole watersheds understand the effects of pollution in both terrestrial and aquatic environments study extreme systems such as hydrothermal vents follow migrating organisms In each case, the book explains the background to the methodology, looks at the underlying principles and assumptions, and outlines the potential limitations and pitfalls. Stable Isotopes in Ecology and Environmental Science is an ideal resource for both ecologists who are new to isotopic analysis, and more experienced isotope ecologists interested in innovative techniques and pioneering new uses.

Radioactive and Stable Isotope Geology - H.-G. Attendorn 1997-02-28

Accelerating progress in the application of radioactive and stable isotope analysis to a varied range of geologicla and geochemical problems in geology has required a complete revision of Isotopes in the Earth Sciences, published in 1988. This new book comprises four parts: the first introduces isotopic chemistry and examines mass spectroscopic methods; the second eeals with radiometric dating methods. Part Three examines the importance of isotopes in climato-environmental studies, and increasingly significant area of research. The last part looks at extra-terrestrial matter, geothermometry and the isotopic geochemistry of the Earth's lithosphere. Post-graduate and post-doctoral researchers in geochemistry, as well as final year undergraduates in the earth and environmental sciences, will find Radioactive and Stable Isotope Geology an invaluable, uo-to-date and thorough treatment of the theory and practice of isotopie geology.

Sample Preparation of Soil and Plant Material for Isotope Ratio Mass Spectrometry - International Atomic Energy Agency 2019-07-02

Stable isotope techniques can help improve soil management and crop nutrition. To ensure the quality of stable isotope analysis through isotope ratio mass spectrometry (IRMS), appropriate sample preparation is crucial. This publication presents methods for proper plant and soil sample processing for IRMS analysis. The information on such methods is often described in a summarized and non-comprehensive way without illustration of every step. This publication fills this gap and presents a selection of standard operating procedures and provides highly detailed guidance on sample preparation that will support practitioners in conducting reliable isotope analysis on plant and soil materials.

Stable Isotopes in Human Nutrition - S. A. Abrams 2003-04-25

The use of stable isotopes in nutritional studies is now widespread, and the technique is becoming increasingly popular. Practical applications are numerous and include:calcium and iron absorption studiesstudies looking at the impacts of diet, physical activity, aging, and

medical therapy and supplementation on nutrient metabolismthe measurement of energy cost of pregnancystudies on the causes of growth faltering in infantsinvestigations into childhood and adult obesity.This book is designed as a laboratory handbook of methods used to perform stable isotope studies in humans. It covers basic principles, dosage information, sample preparation procedures, analytical instrumentation, and necessary mathematical methods and provides the fundamentals to enable researchers to evaluate and establish stable isotope methods in their own laboratories.

Global Strategy for Infant and Young Child Feeding - Organisation mondiale de la santé 2003

WHO and UNICEF jointly developed this global strategy to focus world attention on the impact that feeding practices have on the nutritional status, growth and development, health, and thus the very survival of infants and young children. The strategy is the result of a comprehensive two-year participatory process. It is based on the evidence of nutrition's significance in the early months and years of life, and of the crucial role that appropriate feeding practices play in achieving optimal health outcomes. The strategy is intended as a guide for action; it identifies interventions with a proven positive impact; it emphasizes providing mothers and families the support they need to carry out their crucial roles, and it explicitly defines the obligations and responsibilities in this regards of governments, international organizations, and other concerned parties.

Stable Isotope Forensics - Wolfram Meier-Augenstein 2017-12-18

The number-one guide, internationally, to all aspects of forensic isotope analysis, thoroughly updated and revised and featuring many new case studies This edition of the internationally acclaimed guide to forensic stable isotope analysis uses real-world examples to bridge discussions of the basic science, instrumentation and analytical techniques underlying forensic isotope profiling and its various technical applications. Case studies describe an array of applications, many of which were developed by the author himself. They include cases in which isotope profiling was used in murder, and drugs-related crime investigations, as well as for pharmaceutical and food authenticity control studies. Updated with coverage of exciting advances occurring in the field since the publication of the 1st edition, this 2nd edition explores innovative new techniques and applications in forensic isotope profiling, as well as key findings from original research. More than a simple update, though, this edition has been significantly revised in order to address serious problems that can arise from non-comparable and unfit-for-purpose stable isotope data. To that end, Part II has been virtually rewritten with greater emphasis now being placed on important quality control issues in stable isotope analysis in general and forensic stable isotope analysis in particular. Written in a highly accessible style that will appeal to practitioners, researchers and students alike Illustrates the many strengths and potential pitfalls of forensic stable isotope analysis Uses recent case examples to bridge underlying principles with technical applications Presents hands-on applications that let experienced researchers and forensic practitioners match problems with success stories Includes new chapters devoted to aspects of quality control and quality assurance, including scale normalisation, the identical treatment principle, hydrogen exchange and accreditation Stable Isotope Forensics, 2nd Edition is an important professional resource for forensic scientists, law enforcement officials, public prosecutors, defence attorneys, forensic anthropologists and others for whom isotope profiling has become an indispensable tool of the trade. It is also an excellent introduction to the field for senior undergraduate and graduate forensic science students. "All students of forensic criminology, and all law enforcement officers responsible for the investigation of serious crime , will want to study this book. Wolfram highlights the value, and future potential, of Stable Isotope Forensics as an emerging powerful tool in the investigation of crime." —Roy McComb, Deputy Director, Specialist Investigations, National Crime Agency (NCA), UK “A single author text in these days is rare and the value of this book lies in the dedication and experience of the author which is evident in the clarity of prose, the honest illustration of evidence and the realistic practical

application of the subject - it makes this a text of genuine scientific value." — Prof Dame Sue Black, PhD, DBE, OBE, FRSE, Leverhulme Research Centre for Forensic Science, University of Dundee, UK The book provides an excellent, vivid and comprehensible introduction into the world of stable isotope science and analytics. Compared to the first edition, the aspects of quality control and assurance in the analysis of stable isotopes in general, and forensic application in particular, are now taking much more room. This allows the book to serve the target groups: students, academic professionals and practitioners, and serves as a solid resource of basic and applicable information about the strengths and potential pitfalls of the application of stable isotope signatures. The present high-quality book shows the great potential of stable isotopes and is a must for everyone interested in isotope forensics. M.E. Böttcher & U. Flenker, Isotopes in Environmental and Health Studies, January 2018. A list of errata is available at http://booksupport.wiley.com

Topics in Oceanography - Enrico Zambianchi 2013-07-10

Oceanography is the par excellence interdisciplinary science thanks to its peculiar setting within a fluid environment that makes connections extremely efficient. The oceans connections are well mirrored in the chapters of this book that share a quite explicit multidisciplinary and multi-environmental character. The book provides chapters on very different topics under very different settings, some with a focused angle, others with a broader approach, yet all sharing the idea that we need to understand the small pieces in order to put together the big picture for a much larger mechanism, the functioning of the ocean as a whole.

Guidelines for Sediment Tracing Using the Compound Specific Carbon Stable Isotope Technique - International Atomic Energy Agency 2019

Isotopes for Medicine and the Life Sciences - Institute of Medicine 1995-01-27

Radioactive isotopes and enriched stable isotopes are used widely in medicine, agriculture, industry, and science, where their application allows us to perform many tasks more accurately, more simply, less expensively, and more quickly than would otherwise be possible. Indeed, in many cases--for example, biological tracers--there is no alternative. In a stellar example of "technology transfer" that began before the term was popular, the Department of Energy (DOE) and its predecessors has supported the development and application of isotopes and their transfer to the private sector. The DOE is now at an important crossroads: Isotope production has suffered as support for DOE's laboratories has declined. In response to a DOE request, this book is an intensive examination of isotope production and availability, including the education and training of those who will be needed to sustain the flow of radioactive and stable materials from their sources to the laboratories and medical care facilities in which they are used. Chapters include an examination of enriched stable isotopes; reactor and accelerator-produced radionuclides; partnerships among industries, national laboratories, and universities; and national isotope policy.

Compound-specific Stable Isotope Analysis - Maik A Jochmann 2015-11-09

The use of Compound-specific Stable Isotope Analysis (CSIA) is increasing in many areas of science and technology for source allocation, authentication, and characterization of transformation reactions. Until now, there have been no textbooks available for students with an analytical chemical background or basic introductory books emphasising the instrumentation and theory. This book is the first to focus solely on stable isotope analysis of individual compounds in sometimes complex mixtures. It acts as both a lecture companion for students and a consultant for advanced scientists in fields including forensic and environmental science. The book starts with a brief history of the field before going on to explain stable isotopes from scratch. The different ways to express isotope abundances are introduced together with isotope effects and isotopic fractionation. A detailed account of the required technical equipment and general procedures for CSIA is provided. This includes sections on derivatization and the use of

microextraction techniques in GC-IRMS. The very important topic of referencing and calibration in CSIA is clearly described. This differs from approaches used in quantitative analysis and is often difficult for the newcomer to comprehend. Examples of successful applications of CSIA in food authenticity, forensics, archaeology, doping control, environmental science, and extraterrestrial materials are included. Applications in isotope data treatment and presentation are also discussed and emphasis is placed on the general conclusions that can be drawn from the uses of CSIA. Further instrumental developments in the field are highlighted and selected experiments are introduced that may act as a basis for a short practical course at graduate level.

Nitrogen Isotope Techniques - 2012-12-02

This book is the first laboratory manual to bring together basic procedures for measurement of stable and radioactive isotopes of nitrogen, with specific applications to plant, soil, and aquatic biology. This bench-top reference gives practical coverage of mass and emission spectrometry, nitrogen fixation, nitrification, and identification, organic nitrogen, and the radioactive isotope 13N. Methods are described so that researchers can adapt them, without the aid of outside references, to virtually any task they may encounter in investigations of nitrogen transformation processes. Serves as a practical guide for nitrogen isotope techniques Features studies of nitrogen transformations in terrestrial and aquatic systems Includes basic measurement techniques plus specific applications for stable and radioactive nitrogen isotopes Presents detailed protocols, overviews, and key references Includes fifty figures and sixteen tables Hands-on reference for both students and researchers

Handbook of Stable Isotope Analytical Techniques - Pier A. de Groot 2004-10-27

(Parent with price) Volume I contains subjective reviews, specialized and novel technique descriptions by guest authors. Part 1 includes contributions on purely analytical techniques and Part 2 includes matters such as development of mass spectrometers, stability of ion sources, standards and calibration, correction procedures and experimental methods to obtain isotopic fractionation factors. Volume II will be available in 2005.

Stable Isotope Forensics - Wolfram Meier-Augenstein 2017-10-06

The number-one guide, internationally, to all aspects of forensic isotope analysis, thoroughly updated and revised and featuring many new case studies This edition of the internationally acclaimed guide to forensic stable isotope analysis uses real-world examples to bridge discussions of the basic science, instrumentation and analytical techniques underlying forensic isotope profiling and its various technical applications. Case studies describe an array of applications, many of which were developed by the author himself. They include cases in which isotope profiling was used in murder, and drugs-related crime investigations, as well as for pharmaceutical and food authenticity control studies. Updated with coverage of exciting advances occurring in the field since the publication of the 1st edition, this 2nd edition explores innovative new techniques and applications in forensic isotope profiling, as well as key findings from original research. More than a simple update, though, this edition has been significantly revised in order to address serious problems that can arise from non-comparable and unfit-for-purpose stable isotope data. To that end, Part II has been virtually rewritten with greater emphasis now being placed on important quality control issues in stable isotope analysis in general and forensic stable isotope analysis in particular. Written in a highly accessible style that will appeal to practitioners, researchers and students alike Illustrates the many strengths and potential pitfalls of forensic stable isotope analysis Uses recent case examples to bridge underlying principles with technical applications Presents hands-on applications that let experienced researchers and forensic practitioners match problems with success stories Includes new chapters devoted to aspects of quality control and quality assurance, including scale normalisation, the identical treatment principle, hydrogen exchange and accreditation Stable Isotope Forensics, 2nd Edition is an important professional resource for forensic scientists, law enforcement officials, public prosecutors, defence attorneys, forensic anthropologists and others for whom isotope profiling has become an

indispensable tool of the trade. It is also an excellent introduction to the field for senior undergraduate and graduate forensic science students. "All students of forensic criminology, and all law enforcement officers responsible for the investigation of serious crime , will want to study this book. Wolfram highlights the value, and future potential, of Stable Isotope Forensics as an emerging powerful tool in the investigation of crime." —Roy McComb, Deputy Director, Specialist Investigations, National Crime Agency (NCA), UK “A single author text in these days is rare and the value of this book lies in the dedication and experience of the author which is evident in the clarity of prose, the honest illustration of evidence and the realistic practical application of the subject - it makes this a text of genuine scientific value.” — Prof Dame Sue Black, PhD, DBE, OBE, FRSE, Leverhulme Research Centre for Forensic Science, University of Dundee, UK The book provides an excellent, vivid and comprehensible introduction into the world of stable isotope science and analytics. Compared to the first edition, the aspects of quality control and assurance in the analysis of stable isotopes in general, and forensic application in particular, are now taking much more room. This allows the book to serve the target groups: students, academic professionals and practitioners, and serves as a solid resource of basic and applicable information about the strengths and potential pitfalls of the application of stable isotope signatures. The present high-quality book shows the great potential of stable isotopes and is a must for everyone interested in isotope forensics. M.E. Böttcher & U. Flenker, Isotopes in Environmental and Health Studies, January 2018.

Mass Spectrometry and Stable Isotopes in Nutritional and Pediatric Research - Henk Schierbeek 2017-01-30

A guide for scientists, pediatricians and students involved in metabolic studies in pediatric research Addresses the availability of modern analytical techniques and how to apply these techniques in metabolic studies Covers the whole range of available mass spectrometric techniques used for metabolic studies including Stable Isotope Methodology Presents the relevance of mass spectrometry and stable isotope methodology in pediatric research covering applications in Nutrition, Obesity, Metabolic Disorders, and Kidney Disorders Focuses on the interactions between nutrients and the endogenous metabolism within the body and how these factors affect the health of a growing infant

The Elements: A Very Short Introduction - Philip Ball 2004-04-08

This Very Short Introduction traces the history and cultural impact of the elements on humankind, and examines why people have long sought to identify the substances around them. Looking beyond the Periodic Table, the author takes the reader on an engaging and entertaining tour: from the Greek philosophers who propounded a system with four elements - earth, air, fire, and water - to the modern-day scientists who are able to create their own.

Stable Isotopes - H. Griffiths 2020-08-18

In this authoritative review, leading international researchers explore the growing range of applications of stable isotope techniques for probing and integrating biological processes and palaeoclimatic cycles. The interdisciplinary approach covers a wide range of issues, opportunities and developments, setting interactions with plants in the context of water and nutrient cycles, exchanges with the atmosphere and modelling past and present climate change. This important book will appeal to those requiring an overview of the use of stable isotopes in aquatic, terrestrial and climatic processes and is in tune with current global concerns. In addition postgraduates and research scientists will find an extensive guide to more specialist disciplines, including developing mass spectrometer technologies, compound-specific and cellular-discrimination processes or whole organism and ecosystem responses.

Advances in Isotope Methods for the Analysis of Trace Elements in Man - Malcolm Jackson 2000-11-29

There is increasing evidence that even minute amounts of trace elements can have profound effects on the human body. Advances in Isotope Methods for the Analysis of Trace Elements in Man describes new methods that are being developed to understand normal and abnormal trace element nutrition and metabolism. This

book includes a wealth of practical advice, encompassing all aspects of isotope methodology, such as the latest developments of analysis techniques for both stable and radioactive isotopes, issues in study design, current cost of isotopes, and analysis. It provides both a historical review of what has been done in the past and details of current techniques and applications. > This state-of-the-art collection from leading experts in the field from Europe and the United States makes a strong case for the practice and advancement of this critical health care tool.

Stable Isotope Forensics - Wolfram Meier-Augenstein 2017-09-28

The number-one guide, internationally, to all aspects of forensic isotope analysis, thoroughly updated and revised and featuring many new case studies This edition of the internationally acclaimed guide to forensic stable isotope analysis uses real-world examples to bridge discussions of the basic science, instrumentation and analytical techniques underlying forensic isotope profiling and its various technical applications. Case studies describe an array of applications, many of which were developed by the author himself. They include cases in which isotope profiling was used in murder, and drugs-related crime investigations, as well as for pharmaceutical and food authenticity control studies. Updated with coverage of exciting advances occurring in the field since the publication of the 1st edition, this 2nd edition explores innovative new techniques and applications in forensic isotope profiling, as well as key findings from original research. More than a simple update, though, this edition has been significantly revised in order to address serious problems that can arise from non-comparable and unfit-for-purpose stable isotope data. To that end, Part II has been virtually rewritten with greater emphasis now being placed on important quality control issues in stable isotope analysis in general and forensic stable isotope analysis in particular. Written in a highly accessible style that will appeal to practitioners, researchers and students alike Illustrates the many strengths and potential pitfalls of forensic stable isotope analysis Uses recent case examples to bridge underlying principles with technical applications Presents hands-on applications that let experienced researchers and forensic practitioners match problems with success stories Includes new chapters devoted to aspects of quality control and quality assurance, including scale normalisation, the identical treatment principle, hydrogen exchange and accreditation Stable Isotope Forensics, 2nd Edition is an important professional resource for forensic scientists, law enforcement officials, public prosecutors, defence attorneys, forensic anthropologists and others for whom isotope profiling has become an indispensable tool of the trade. It is also an excellent introduction to the field for senior undergraduate and graduate forensic science students. "All students of forensic criminology, and all law enforcement officers responsible for the investigation of serious crime , will want to study this book. Wolfram highlights the value, and future potential, of Stable Isotope Forensics as an emerging powerful tool in the investigation of crime." —Roy McComb, Deputy Director, Specialist Investigations, National Crime Agency (NCA), UK “A single author text in these days is rare and the value of this book lies in the dedication and experience of the author which is evident in the clarity of prose, the honest illustration of evidence and the realistic practical application of the subject - it makes this a text of genuine scientific value.” — Prof Dame Sue Black, PhD, DBE, OBE, FRSE, Leverhulme Research Centre for Forensic Science, University of Dundee, UK The book provides an excellent, vivid and comprehensible introduction into the world of stable isotope science and analytics. Compared to the first edition, the aspects of quality control and assurance in the analysis of stable isotopes in general, and forensic application in particular, are now taking much more room. This allows the book to serve the target groups: students, academic professionals and practitioners, and serves as a solid resource of basic and applicable information about the strengths and potential pitfalls of the application of stable isotope signatures. The present high-quality book shows the great potential of stable isotopes and is a must for everyone interested in isotope forensics. M.E. Böttcher & U. Flenker, Isotopes in Environmental and Health Studies, January 2018.

Stable Isotope Probing - Marc G. Dumont 2019-08-13
This book provides definitive methods to perform stable isotope probing (SIP) experiments, covering a wide spectrum of stable isotope techniques used in microbial ecology, such as methods to target and analyze labeled DNA, rRNA, mRNA, protein, and PLFA. Protocols to study stable isotope fractionation by microbial pathways, the analysis of labeled communities with Raman microscopy, Chip-SIM, as well as quantitative SIP (qSIP) and high-resolution SIP (HR-SIP) are also featured. Written for the highly successful Methods in Molecular Biology series, chapters include introductions to their respective topics, lists of the necessary materials and reagents, step-by-step, readily reproducible laboratory protocols, and tips on troubleshooting and avoiding known pitfalls. Authoritative and practical, Stable Isotope Probing: Methods and Protocols provides readers with up-to-date protocols ranging from basic to the most sophisticated applications of SIP and will benefit anyone pursuing this exciting area of study.
Stable Isotopes in Sedimentary Geology - Michael A. Arthur 1983

Stable Isotope Hydrology - J. R. Gat 1981

Studies of Plant Terpenoid Biosynthesis Using 13C Stable Isotope Labeling Techniques - Andrea Ghirardo 2011

Tracking Environmental Change Using Lake Sediments - William M. Last 2006-04-11
Theory Instrumentation NIR analysis of sediment samples Uses of NIRS in palaeolimnology Future perspectives Summary References Fly-ash particles. Neil Rose 319 12. Introduction A brief history Methods of extraction and enumeration Temporal distribution Spatial distribution Source apportionment The future Summary Acknowledgements References Part III: Stable Isotope Techniques 13. Application of stable isotope techniques to inorganic and biogenic carbonates. Emi Ito 351 Introduction Nomenclature and systematics of lake-water Mg/Ca and Sr/Ca ratios of lake-water of dissolved inorganic carbon (DIC) Carbonates in lake-sediments Mollusks Ostracodes Charaphytes Isotope analysis Preparation of carbonate samples for isotope analysis Conclusions Summary Acknowledgments References 14. Carbon and oxygen isotope analysis of lake sediment cellulose: methods and applications. Brent B. Wolfe, Thomas W. D. Edwards, Richard J. Elgood & Kristina R. M. Beuning 373 xi Introduction Stable isotope tracers in lake Historical development Methods Key criteria for paleohydrologic reconstruction Applications Future research directions Summary Acknowledgements References Nitrogen isotopes in palaeolimnology. Michael R. Talbot 15. 401 Introduction Nitrogen in lakes: forms and distribution Nitrogen isotopes Nitrogen isotope studies in palaeolimnology: sampling and measurement Some examples Closing remarks Summary Acknowledgments References Glossary, acronyms and abbreviations 441 Index 493 xiii PREFACE The explosive growth of paleolimnology over the past two decades has provided impetus for the publication of this series of monographs detailing the numerous advances and new techniques being applied to the interpretation of lake histories. This is the second volume in the series and deals mainly with physical and geochemical analytical techniques.
Handbook of Stable Isotope Analytical Techniques - Pier A. de Groot 2008-11-10
This two-volume reference serves as a handbook containing a wealth of information for all isotope chemists working in a wide range of disciplines including anthropology to ecology; drug detection methodology to toxicology; nutrition to food science; and the atmospheric sciences to geochemistry. Complementing the first volume, Volume II includes matters that are not strictly confined to the analytical techniques themselves, but relate to analysis of stable isotopes, such as the views on the development of mass spectrometers, isotopic scales, standards and references, and directives for setting up a laboratory. ALSO AVAILABLE: Volume I: Dec. 2004, 0444511148/9780444511140, $176.00 Volume I and II (set): Oct. 2007, 0444511164/9780444511164, $205.00 * Presents an encyclopedic overview of stable isotope analytical techniques in an objective way

* Includes descriptions of methods and diagrams of analytical devices * Addresses how older techniques formed the basis for present-day techniques, which can be useful in constructing modern analytical systems * Completments Volume I of the set

Stable Isotope Techniques in the Study of Biological Processes and Functioning of Ecosystems - M.J. Unkovich 2010-10-28

In the last two decades technological advances in isotope ratio mass spectrometry have been very rapid, opening up new possibilities for analysis of biological and environmental materials. The new instrumentation has facilitated faster analysis of samples via automated sample preparation and multi-isotope analysis of single samples, resulting in considerable cost savings, and enabling access to isotope analysis for many more researchers. These changes are reflected in the rapidly growing international literature on stable isotopes. While there have been some excellent books and review papers aimed at interpreting isotope signals in biology and environmental science, there have been fewer attempts to provide practical tools for researchers making forays into this exciting new arena. This book aims to address this inadequacy by providing a set of practical guidelines for the application of a range of novel and well proven stable isotope techniques to the fields of plant physiological ecology, agriculture, marine ecology and palaeoecology. The book is the outcome of a weeklong workshop held under the auspices of the Cooperative Research Centre for Legumes in Mediterranean Agriculture (CLIMA 1992 - 2000) at The University of Western Australia and the CSIRO Floreat Laboratories, Perth, Western Australia, in February 1999. The workshop was designed to provide practical tools and experiences for researchers and students concerned with how one goes about using stable isotopes in field investigations.

Use of Water Stable Isotopes in Hydrological Process - Polona Vreča 2020-10-12

Stable and radioactive isotopes in water are powerful tools in the tracking of the path of water molecules through the whole water cycle. In the last decade, a considerable number of studies have been published on the use of water isotopes, and their number is ever-growing. The main reason is the development of new measurement techniques (i.e., laser absorption spectroscopy) that allow measurements of stable isotope ratios at ever-higher resolutions. Therefore, this compilation of papers has been published to address the current state-of-the-art water isotope methods, applications, and interpretations of hydrological processes, and to contribute to the rapidly growing repository of isotope data, which is important for future water resource management. We are pleased to present here a book with new findings in thirteen original research papers and one review paper issued in the Water MDPI Special Issue (SI) "Use of Water Isotopes in Hydrological Processes". The authors report the use of water isotopes in hydrological processes worldwide, including studies at both local and regional scales related to either precipitation dynamics or to different applications of water isotopes in combination with other hydrochemical parameters in investigations of surface water, snowmelt, soil water, groundwater and xylem water to identify the hydrological and geochemical processes.

Stable Isotope Studies of the Water Cycle and Terrestrial Environments - A-V. Bojar 2021-11-09

This volume is devoted to Earth surface environmental reconstructions and environmental changes that may be deciphered and modelled using stable isotopes along with mineralogical/chemical, sedimentological, palaeontological/biological and climatological methodologies. The book is divided into two sections, both using stable isotopes (see www.geolsoc.org.uk/SP507) in various samples and phases as the main research tool. The first section is devoted to studies focusing on the distribution of isotopes in precipitation, groundwater, lakes, rivers, springs, tap water, mine water and their relationship with terrestrial environments at regional to continental scale. In relation to this, the second section includes case studies from a range of continental settings, investigating cave deposits (stalagmites, bat guano), animal skeletons (dinosaurs, alligators, turtles, bivalves), present and past soils (palaeosols) and limestones. The sections focus on the interaction between the

surficial water cycle and underground water storage with deposits acting as archives of short- to long-term climatic and environmental changes. Examples from the Early Cretaceous to present time come from Europe, Asia, Africa, North and South America.

Isotopes in the Water Cycle - Pradeep K. Aggarwal 2007-08-31

Environmental isotope and nuclear techniques provide unmatched insights into the processes governing the water cycle and its variability. This monograph presents state of the art applications and new developments of isotopes in hydrology, environmental disciplines and climate change studies. Coverage ranges from the assessment of groundwater resources in terms of recharge and flow regime to studies of the past and present global environmental and climate changes.

Carbon Isotope Techniques - David C. Coleman 2012-12-02

Carbon Isotope Techniques deals with the use of carbon isotopes in studies of plant, soil, and aquatic biology. Topics covered include photosynthesis/translocation studies in terrestrial ecosystems; carbon relationships of plant-microbial symbioses; microbe/plant/soil interactions; and environmental and aquatic toxicology. Stable carbon isotope ratios of natural materials are also considered. Comprised of 15 chapters, this book begins with an introduction to radiation-counting instruments used in measuring the radioactivity in soil and plant samples containing carbon-14. The discussion then turns to the basic methods of 14C use in plant science, highlighted by three examples of applications in the field of plant physiology and ecology. Subsequent chapters explore the use of carbon isotope techniques for analyzing the carbon relationships of plant-microbial symbioses; the interactions of microbes, plants, and soils; and the degradation of herbicides and organic xenobiotics. Carbon dating and bomb carbon are also described. The final section is devoted to the uses and procedures for 13C and 11C. This monograph is intended for advanced undergraduate or graduate students, as well as generalist scientists who have not previously used radioisotopes or stable isotopes in their research.

Stable Isotopes in Human Nutrition - Steven A. Abrams 2003

The use of stable isotopes in nutritional studies is now widespread, and the technique is becoming increasingly popular. This book is a laboratory handbook of methods to perform stable isotope studies in humans. It covers basic principles, dosage information, sample preparation procedures, analytical instrumentation, and necessary mathematical methods.

Mass Spectrometry of Natural Substances in Food - Fred Mellon 2000

Introduces the principles, practice, and application of mass spectrometric techniques in the study of natural substances in foods. Early chapters address the principles and practice of mass spectrometry, followed by applications in flavor analysis and the determination of non-nutrient, biologically-active, natural substances in foods. Also covered is the analysis and metabolic study of amino acids, peptides, proteins, lipids, sugars, carbohydrates, and vitamins, with separate chapters on mineral and micronutrient metabolism and techniques of pyrolysis mass spectrometry. Annotation copyrighted by Book News, Inc., Portland, OR

Non-Traditional Stable Isotopes - Fang-Zhen Teng 2017-03-06

The development of multi-collector inductively coupled plasma mass spectrometry (MC-ICPMS) makes it possible to precisely measure non-traditional stable isotopes. This volume reviews the current status of non-traditional isotope geochemistry from analytical, theoretical, and experimental approaches to analysis of natural samples. In particular, important applications to cosmochemistry, high-temperature geochemistry, low-temperature geochemistry, and geobiology are discussed. This volume provides the most comprehensive review on non-traditional isotope geochemistry for students and researchers who are interested in both the theory and applications of non-traditional stable isotope geochemistry.

Isotope Tracers in Metabolic Research - Robert R. Wolfe 2004-10-18

In the past few years, the number of applications of tracers for in vivo biomedical studies has greatly increased. New analytical tools at the genetic and protein levels have spurred this

growth, opening the door for a deeper understanding of metabolic events. This in turn promises to yield significant advances in the understanding and treatment of human disease. Now fully revised and expanded, Isotope Tracers in Metabolic Research, Second Edition is the established definitive text on stable and radioactive isotope tracers. In unique, multidisciplinary fashion, it presents comprehensive coverage of new methodological, mathematical, and theoretical approaches. This new Second Edition includes: All-new chapters on nuclear magnetic resonance, mass isotopomer analysis, and methods of protein metabolism analysis A completely updated categorized list of over 750 references Major advances in the development of mass isotopomer and positional isotopomer techniques, noninvasive isotope techniques for studying metabolic pathways, hyphenated techniques, and new tracer techniques The latest developments in quantification of DNA synthesis and mass spectrometry spurred by genome sequencing and proteomics New coverage of mathematical modeling Expanded coverage of microdialysis probes, laboratory procedures, and regulatory issues related to human studies In this complete guide to performing tracer studies, the authors systematically cover tracer selection, modeling considerations, sample derivitization, mass spectrometry analysis, and data interpretation. Problems and discussion questions highlight key points in each chapter. Isotope Tracers in Metabolic Research, Second Edition offers students and researchers a comprehensive, practical resource for utilizing the latest tracer methodologies.