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# Geologic Time Scale 2012

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Geomathematics: Theoretical Foundations, Applications and Future Developments  
Geoscience Handbook, AGI Data Sheets 2016, 5th Edition  
Geology of New York  
A Concise Geologic Time Scale  
The Anthropocene as a Geological Time Unit  
Time's Arrow, Time's Cycle  
A Framework for K-12 Science Education  
Strata and Time  
Climate Change  
Carbon Isotope Stratigraphy  
Absolute Age Determination  
Evolution and Development of Fishes  
Fossil Mammals of Asia  
Paul J. Crutzen and the Anthropocene: A New Epoch in Earth's History  
Problems of Geocosmos-2018  
The Geologic Time Scale 2012: The Cambrian period  
The Geologic Time Scale 2020  
STRATI 2013  
Stratigraphy: A Modern Synthesis  
Geologic Time Scale 2020  
Regional Geology and Tectonics: Principles of Geologic Analysis  
Sedimentology and Stratigraphy  
Paleoecology  
Introduction to Paleobiology and the Fossil Record  
Geologic Time Scale 2020  
Structural Geology of Rocks and Regions  
The Birth of the Anthropocene  
Fundamentals of Invertebrate Palaeontology  
Cyclostratigraphy and Astrochronology  
The Geologic Time Scale 2012: The chronostratigraphic scale  
Encyclopedia of Lunar Science  
The Geologic Time Scale 2012  
Making the Geologic Now  
Magnetic Stratigraphy  
Fundamentals of Geomorphology  
A Geologic Time Scale 2004  
Encyclopedia of Geology  
The Age of the Earth  
The Geologic Time Scale 2012  
Applications of Palaeontology

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**DARIO SHANIYA**


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*Geomathematics: Theoretical Foundations, Applications and Future Developments* John Wiley & Sons

This book provides a wealth of geomathematical case history studies performed by the author during his career at the Ministry of Natural Resources Canada, Geological Survey of Canada (NRCan-GSC). Several of the techniques newly developed by the author and colleagues that are described in this book have become widely adopted, not only for further research by geomathematical colleagues, but by government organizations and industry worldwide. These include Weights-of-Evidence modelling, mineral resource estimation technology, trend surface analysis, automatic stratigraphic correlation and nonlinear geochemical exploration methods. The author has developed maximum likelihood methodology and spline-fitting techniques for the construction of the international numerical geologic timescale. He has introduced the application of new theory

of fractals and multi fractals in the geostatistical evaluation of regional mineral resources and ore reserves and to study the spatial distribution of metals in rocks. The book also contains sections deemed important by the author but that have not been widely adopted because they require further research. These include the geometry of preferred orientations of contours and edge effects on maps, time series analysis of Quaternary retreating ice sheet related sedimentary data, estimation of first and last appearances of fossil taxa from frequency distributions of their observed first and last occurrences, tectonic reactivation along pre-existing schistosity planes in fold belts, use of the grouped jackknife method for bias reduction in geometrical extrapolations and new applications of the theory of permanent, volume-independent frequency distributions.

*Geoscience Handbook, AGI Data Sheets 2016, 5th Edition* Elsevier  
 Climate Change: Observed Impacts on Planet Earth, Third Edition, brings together top global researchers

across many disciplines to provide a comprehensive review on the complex issue of climate change and weather patterns. The third edition continues its tradition of focusing on the science and evidence on this highly politicized topic. Every chapter is updated, with this new edition featuring new chapters on topics such as glacier melt, the impacts of rising temperatures, extreme weather, modeling techniques, biodiversity, and more. This book is essential for researchers, environmental managers, engineers, and those whose work is impacted by, or tied to, climate change and global warming. - Provides a comprehensive resource on climate change and weather patterns, ranging from causes and indicators to modeling and adaptation - Covers the Jet Stream, catastrophic modeling, extreme weather, the carbon cycle, socioeconomic impacts, biological diversity, deforestation and global temperature - Contains 25 updated chapters and 10 new chapters, all written by global experts who provide a current overview of the state of knowledge on climate

change across a wide array of disciplines  
*Geology of New York*  
Cambridge University Press

The Geologic Time Scale 2012, winner of a 2012 PROSE Award Honorable Mention for Best Multi-volume Reference in Science from the Association of American Publishers, is the framework for deciphering the history of our planet Earth. The authors have been at the forefront of chronostratigraphic research and initiatives to create an international geologic time scale for many years, and the charts in this book present the most up-to-date, international standard, as ratified by the International Commission on Stratigraphy and the International Union of Geological Sciences. This 2012 geologic time scale is an enhanced, improved and expanded version of the GTS2004, including chapters on planetary scales, the Cryogenian-Ediacaran periods/systems, a prehistory scale of human development, a survey of sequence stratigraphy, and an extensive compilation of stable-isotope chemostratigraphy. This

book is an essential reference for all geoscientists, including researchers, students, and petroleum and mining professionals. The presentation is non-technical and illustrated with numerous colour charts, maps and photographs. The book also includes a detachable wall chart of the complete time scale for use as a handy reference in the office, laboratory or field. The most detailed international geologic time scale available that contextualizes information in one single reference for quick desktop access Gives insights in the construction, strengths, and limitations of the geological time scale that greatly enhances its function and its utility Aids understanding by combining with the mathematical and statistical methods to scaled composites of global succession of events Meets the needs of a range of users at various points in the workflow (researchers extracting linear time from rock records, students recognizing the geologic stage by their content)  
A Concise Geologic Time Scale Springer  
Regional Geology and

Tectonics: Principles of Geologic Analysis, 2nd edition is the first in a three-volume series covering Phanerozoic regional geology and tectonics. The new edition provides updates to the first edition's detailed overview of geologic processes, and includes new sections on plate tectonics, petroleum systems, and new methods of geological analysis. This book provides both professionals and students with the basic principles necessary to grasp the conceptual approaches to hydrocarbon exploration in a wide variety of geological settings globally. - Discusses in detail the principles of regional geological analysis and the main geological and geophysical tools - Captures and identifies the tectonics of the world in detail, through a series of unique geographic maps, allowing quick access to exact tectonic locations - Serves as the ideal introductory overview and complementary reference to the core concepts of regional geology and tectonics offered in volumes 2 and 3 in the series

The Anthropocene as a Geological Time Unit

Routledge

A new detailed international geologic time scale, including methodology and a wallchart.

**Time's Arrow, Time's Cycle** Cambridge

University Press

Magnetic Stratigraphy is the most comprehensive book written in the English language on the subject of magnetic polarity stratigraphy and time scales. This volume presents the entirety of the known

geomagnetic record, which now extends back about 300 million years. The book includes the results of current research on sea floor spreading, magnetic stratigraphy of the Pliocene and Pleistocene, and postulations on the Paleozoic. Also included are both historical background and applications of magnetostratigraphy. Individual chapters on correlation are presented, using changes in magnetic properties and secular variation. Key Features\* Discusses pioneering work in the use of marine sediments to investigate the Earth's magnetic field\* Serves as a guide for students wishing to begin studies

in magnetostratigraphy\* Provides a comprehensive guide to magnetic polarity stratigraphy including up-to-date geomagnetic polarity time scales\*

Correlates magnetic stratigraphics from marine and non-marine Cenozoic sequences\* Details reversal history of the magnetic field for the last 350 million years\*

Discusses correlation using magnetic dipole intensity changes\* Up-to-date correlation of biostratigraphy with magnetic stratigraphy through the late Jurassic

*A Framework for K-12 Science Education*

Elsevier

Geologic Time Scale 2020 (2 volume set) contains contributions from 80+ leading scientists who present syntheses in an easy-to-understand format that includes numerous color charts, maps and photographs. In addition to detailed overviews of chronostratigraphy, evolution, geochemistry, sequence stratigraphy and planetary geology, the GTS2020 volumes have separate chapters on each geologic period with compilations of the history of divisions, the current GSSPs (global boundary stratotypes), detailed bio-geochem-

sequence correlation charts, and derivation of the age models. The authors are on the forefront of chronostratigraphic research and initiatives surrounding the creation of an international geologic time scale. The included charts display the most up-to-date, international standard as ratified by the International Commission on Stratigraphy and the International Union of Geological Sciences. As the framework for deciphering the history of our planet Earth, this book is essential for practicing Earth Scientists and academics. - Completely updated geologic time scale - Provides the most detailed integrated geologic time scale available that compiles and synthesizes information in one reference - Gives insights on the construction, strengths and limitations of the geological time scale that greatly enhances its function and its utility

**Strata and Time**

Springer Nature

World-class

palaeontologists and biologists summarise the state-of-the-art on fish evolution and development.

Climate Change Springer  
Reviews the evidence underpinning the Anthropocene as a geological epoch written by the Anthropocene Working Group investigating it. The book discusses ongoing changes to the Earth system within the context of deep geological time, allowing a comparison between the global transition taking place today with major transitions in Earth history.

Carbon Isotope Stratigraphy Columbia University Press  
The spectrum of physical and chemical dating methods now covers the entire range of Earth history. But there are so many methods that it is becoming increasingly difficult to select those that are appropriate for solving a specific problem. The objective of this book is to cover the whole spectrum of methods and to give examples of their applications. Thus it is addressed to everybody interested in the application of physical and chemical dating methods to the geosciences and archeology. It is especially valuable as a concise, but comprehensive reference

for students and practitioners.  
Absolute Age Determination Springer  
The Geologic Time Scale 2012, winner of a 2012 PROSE Award Honorable Mention for Best Multi-volume Reference in Science from the Association of American Publishers, is the framework for deciphering the history of our planet Earth. The authors have been at the forefront of chronostratigraphic research and initiatives to create an international geologic time scale for many years, and the charts in this book present the most up-to-date, international standard, as ratified by the International Commission on Stratigraphy and the International Union of Geological Sciences. This 2012 geologic time scale is an enhanced, improved and expanded version of the GTS2004, including chapters on planetary scales, the Cryogenian-Ediacaran periods/systems, a prehistory scale of human development, a survey of sequence stratigraphy, and an extensive compilation of stable-isotope chemostratigraphy. This book is an essential

reference for all geoscientists, including researchers, students, and petroleum and mining professionals. The presentation is non-technical and illustrated with numerous colour charts, maps and photographs. The book also includes a detachable wall chart of the complete time scale for use as a handy reference in the office, laboratory or field. - The most detailed international geologic time scale available that contextualizes information in one single reference for quick desktop access - Gives insights in the construction, strengths, and limitations of the geological time scale that greatly enhances its function and its utility - Aids understanding by combining with the mathematical and statistical methods to scaled composites of global succession of events - Meets the needs of a range of users at various points in the workflow (researchers extracting linear time from rock records, students recognizing the geologic stage by their content)  
**Evolution and Development of Fishes** Elsevier  
This book outlines the

development and perspectives of the Anthropocene concept by Paul J. Crutzen and his colleagues from its inception to its implications for the sciences, humanities, society and politics. The main text consists primarily of articles from peer-reviewed scientific journals and other scholarly sources. It comprises selected articles on the Anthropocene published by Paul J. Crutzen and a selection of related articles, mostly but not exclusively by colleagues with whom he collaborated closely. • In the year 2000 Nobel Laureate Paul J. Crutzen proposed the Anthropocene concept as a new epoch in Earth's history • Comprehensive collection of articles on the Anthropocene by Paul J. Crutzen and his colleagues • Unique primary research literature and Crutzen's comprehensive bibliography • Paul Crutzen's scientific investigations into human influences on atmospheric chemistry and physics, the climate and the Earth system, leading to the conception of the Anthropocene • Reflections on the

Anthropocene and its implications • Bibliometric review of the spread of the use of the Anthropocene concept in the Natural and Social Sciences, Humanities and Law  
Fossil Mammals of Asia  
 Elsevier  
 This book provides practical morphological information, together with detailed illustrations and brief explanatory texts. Each chapter starts with a brief introduction, and goes on to describe the respective organism's morphology in detail through numerous illustrations. This is followed by a brief note on its classification, and concludes with illustrated examples of stratigraphically important organisms through time with their major distinguishing characteristics. Featuring over 2500 clearly labelled, hand-drawn and classroom-friendly illustrations, the book offers a fundamental resource for budding palaeontologists, petroleum geologists and palaeobiologists.  
*Paul J. Crutzen and the Anthropocene: A New Epoch in Earth's History*  
 Cambridge University Press  
 Encyclopedia of Geology,

Second Edition presents in six volumes state-of-the-art reviews on the various aspects of geologic research, all of which have moved on considerably since the writing of the first edition. New areas of discussion include extinctions, origins of life, plate tectonics and its influence on faunal provinces, new types of mineral and hydrocarbon deposits, new methods of dating rocks, and geological processes. Users will find this to be a fundamental resource for teachers and students of geology, as well as researchers and non-geology professionals seeking up-to-date reviews of geologic research. Provides a comprehensive and accessible one-stop shop for information on the subject of geology, explaining methodologies and technical jargon used in the field Highlights connections between geology and other physical and biological sciences, tackling research problems that span multiple fields Fills a critical gap of information in a field that has seen significant progress in past years Presents an ideal reference for a wide range of scientists in earth and environmental

areas of study  
Problems of Geocosmos-2018 New York State Museum  
 Geologic Time Scale 2020 contains contributions from 80 leading scientists who present syntheses in an easy-to-understand format that includes numerous color charts, maps and photographs. In addition to detailed overviews of chronostratigraphy, evolution, geochemistry, sequence stratigraphy and planetary geology, the GTS2020 volumes have separate chapters on each geologic period with compilations of the history of divisions, the current GSSPs (global boundary stratotypes), detailed bio-geochem-sequence correlation charts, and derivation of the age models. The authors are on the forefront of chronostratigraphic research and initiatives surrounding the creation of an international geologic time scale. The included charts present the most up-to-date, international standard as ratified by the International Commission on Stratigraphy and the International Union of Geological Sciences. As the framework for deciphering the history of

our planet Earth, this book is essential for practicing Earth Scientists and academics. Completely updated time scale Provides the most detailed international geologic time scale available that compiles and synthesizes information in one reference Gives insights on the construction, strengths and limitations of the geological time scale that greatly enhances its function and its utility

**The Geologic Time Scale 2012: The Cambrian period**

Elsevier  
 PALEOECOLOGY  
 PALEOECOLOGY Past, Present and Future  
 Paleocology is a discipline that uses evidence from fossils to provide an understanding of ancient environments and the ecological history of life through geological time. This text covers the fundamental approaches that have provided the foundation for present paleoecological understanding, and outlines new research areas in paleoecology for managing future environmental and ecological change. Topics include the use of actualism in paleoecology, development of

paleoecological models for paleoenvironmental reconstruction, taphonomy and exceptional fossil preservation, evolutionary paleoecology and ecological change through time, and conservation paleoecology. Data from studies of invertebrates, vertebrates, plants and microfossils, with added emphasis on bioturbation and microbial sedimentary structures, are discussed. Examples from marine and terrestrial environments are covered, with a particular focus on periods of great ecological change, such as the Precambrian-Cambrian transition and intervals of mass extinction.  
 Readership: This book is designed for advanced undergraduates and beginning graduate students in the earth and biological sciences, as well as researchers and applied scientists in a range of related disciplines.

*The Geologic Time Scale 2020* John Wiley & Sons  
 The 1st International Congress on Stratigraphy (STRATI 2013), held in Lisbon, 1–7 July 2013, follows the decision to internationalize the conferences previously organized by the French

Committee of Stratigraphy (STRATI), the last one of which was held in Paris in 2010. Thus, the congress possesses both the momentum gained from an established conference event and the excitement of being the first International Congress on Stratigraphy. It is held under the auspices of the International Commission on Stratigraphy (IUGS) and it is envisaged that this first congress will lead to others being held in the future. This book includes all papers accepted for oral or poster presentation at the 1st International Congress on Stratigraphy. Papers include a short abstract, main text, figures, tables and references. Each paper has been reviewed by two internationally renowned scientists.

**STRATI 2013** John Wiley & Sons

This book presents a comprehensive overview of the science of the history of life. Paleobiologists bring many analytical tools to bear in interpreting the fossil record and the book introduces the latest techniques, from multivariate investigations of biogeography and biostratigraphy to

engineering analysis of dinosaur skulls, and from homeobox genes to cladistics. All the well-known fossil groups are included, including microfossils and invertebrates, but an important feature is the thorough coverage of plants, vertebrates and trace fossils together with discussion of the origins of both life and the metazoans. All key related subjects are introduced, such as systematics, ecology, evolution and development, stratigraphy and their roles in understanding where life came from and how it evolved and diversified. Unique features of the book are the numerous case studies from current research that lead students to the primary literature, analytical and mathematical explanations and tools, together with associated problem sets and practical schedules for instructors and students. New to this edition The text and figures have been updated throughout to reflect current opinion on all aspects New case studies illustrate the chapters, drawn from a broad distribution internationally Chapters on Macroevolution, Form and Function, Mass

extinctions, Origin of Life, and Origin of Metazoans have been entirely rewritten to reflect substantial advances in these topics There is a new focus on careers in paleobiology

*Stratigraphy: A Modern Synthesis* Academic Press

Carbon Isotope Stratigraphy, Volume Five in the Advances in Sequence Stratigraphy series, covers research in stratigraphic disciplines, including the most recent developments in the geosciences. This fully commissioned review publication aims to foster and convey progress in stratigraphy with its inclusion of a variety of topics, including Carbon isotope stratigraphy - principles and applications, Interpreting Phanerozoic  $\delta^{13}C$  patterns as periodic glacio-eustatic sequences, Stable carbon isotopes in archaeological plant remains, Review of the Upper Ediacaran-Lower Cambrian Detrital Series in Central and North Iberia: NE Africa as possible Source Area, Calibrating  $\delta^{13}C$  and  $\delta^{18}O$  chemostratigraphic correlations across Cambrian strata of SW, and much more. - Contains contributions from leading authorities in



the field - Informs and updates on all the latest developments in the field - Aims to foster and convey progress in stratigraphy, including geochronology, magnetostratigraphy, lithostratigraphy, event-stratigraphy, and more

**Geologic Time Scale 2020** Academic Press

A Concise Geologic Time Scale: 2016 presents a summary of Earth's history over the past 4.5 billion years, as well as a brief overview of contemporaneous events on the Moon, Mars, and Venus. The authors have been at the forefront of chronostratigraphic

research and initiatives to create an international geologic time scale for many years, and the charts in this book present the most up-to-date international standard, as ratified by the International Commission on Stratigraphy and the International Union of Geological Sciences. This book is an essential reference for all geoscientists, including researchers, students, and petroleum and mining professionals. The presentation is non-technical and illustrated with numerous colour charts, maps and photographs. - Presents a

summary of Earth's history over the past 4.5 billion years - Includes a brief overview of contemporaneous events on the Moon, Mars, and Venus - Includes full-color figures including charts, stratigraphic profiles, and photographs to enhance understanding of each geologic period - Correlates regional geologic stages to the standard definitions approved by the International Commission on Stratigraphy - Offers an explanation of the methods used to create the time scale - 2017 PROSE Award Finalist in Earth Science