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The Encyclopedia of Early Earth Young Sun, Early Earth and the Origins of Life The Story of Earth The Early Earth Earth Clock Introduction to Geology Ancient Earth, Ancient Skies The Early Earth Introduction to Geology: Earth history. pt. 1. Early stages of earth history. pt. 2. Later stages of earth history Evolution of Early Earth's Atmosphere, Hydrosphere, and Biosphere Mission to Planet Earth Early Earth Systems The Mathematics of the Heavens and the Earth Heaven and Earth in Early Han Thought Life Astrobiology and Cuatro Ciénegas Basin as an Analog of Early Earth Earth! My First 4.54 Billion Years On the Edge of Eternity Early Stages of Earth History Science and Creationism Rare Earth Earth principles, pt.1. Early stages of earth history; pt.2. Later stages of earth history Encyclopedia of Paleoclimatology and Ancient Environments Astrobiology of Earth Earth's Oldest Rocks The Early History of the Earth Ancient Earth Journal: The Early Cretaceous Scenes from Deep Time Origin of the Earth and Moon Deep Carbon The Early Evolution of the Atmospheres of Terrestrial Planets The First Book of the Earth The Life and Death of Planet Earth Life on a Young Planet Ancient Supercontinents and the Paleogeography of Earth The Cosmic Zoo The Rejection of Continental Drift Processes on the Early Earth Earth's Oldest Rocks Carbon in Earth's Interior

Earth principles, pt.1. Early stages of earth history; pt.2. Later stages of earth history Jul 08 2021

Earth's Oldest Rocks Jan 22 2020 Earth's Oldest Rocks, Second Edition, is the only single reference source for geological research of early Earth. This new edition is an up-to-date collection of scientific articles on all aspects of the early history of the Earth, from planetary accretion at 4.567 billion years ago (Ga), to the onset of modern-style plate tectonics at 3.2 Ga. Since the first edition was published, significant new advances have been made in our understanding of events and processes on early Earth that correspond with new advances in technology. The book includes contributions from over 100 authors, all of whom are experts in their respective fields. The research in this reference concentrates on what is directly gleaned from the existing rock record to understand how our planet formed and evolved during the planetary accretion phase, formation of the first crust, the changing dynamics of the mantle and style of tectonics, life's foothold and early development, and mineral deposits. It is an ideal resource for academics, students and the general public alike.

Science and Creationism Sep 10 2021 This edition of Science and Creationism summarizes key aspects of several of the most important lines of evidence supporting evolution. It describes some of the positions taken by advocates of creation science and presents an analysis of these claims. This document lays out for a broader audience the case against presenting religious concepts in science classes. The document covers the origin of the universe, Earth, and life; evidence supporting biological evolution; and human evolution. (Contains 31 references.) (CCM)

Heaven and Earth in Early Han Thought Mar 16 2022 The Huainanzi has in recent years been recognized by scholars as one of the seminal works of Chinese thought at the beginning of the imperial era, a summary of the full flowering of early Taoist philosophy. This book presents a study of three key chapters of the Huainanzi, □The Treatise on the Patterns of Heaven,□ □The Treatise on Topography,□ and □The Treatise on the Seasonal Rules,□ which collectively comprise the most comprehensive extant statement of cosmological thinking in the early Han period. Major presents, for the first time, full English translations of these treatises. He supplements the translations with detailed commentaries that clarify the sometimes arcane language of the text and presents a fascinating picture of the ancient Chinese view of how the world was formed and sustained, and of the role of humans in the cosmos.

Young Sun, Early Earth and the Origins of Life Mar 28 2023 - How did the Sun come into existence? - How was the Earth formed? - How long has Earth been the way it is now, with its combination of oceans and continents? - How do you define "life"? - How did the first life forms emerge? - What conditions made it possible for living things to evolve? All these questions are answered in this colourful textbook addressing undergraduate students in "Origins of Life" courses and the scientifically interested public. The authors take the reader on an amazing voyage through time, beginning five thousand million years ago in a cloud of interstellar dust and ending five hundred million years ago, when the living world that we see today was finally formed. A chapter on exoplanets provides an overview of the search for planets outside the solar system, especially for habitable ones. The appendix closes the book with a glossary, a bibliography of further readings and a summary of the Origins of the Earth and life in fourteen boxes.

Scenes from Deep Time Jan 02 2021 In Scenes from Deep Time, Martin J. S. Rudwick traces the earliest attempts to reconstruct the past no one has ever seen. With over 100 stunning lithographs and engravings from the eighteenth and nineteenth centuries, many reproduced here for the first time since their original publication and accompanied by portions of the original explanatory texts, Rudwick argues that scientists and artists made earth history visually compelling as evidence from nature supplanted the biblical view of the distant past.

Introduction to Geology Nov 24 2022

Carbon in Earth's Interior Dec 21 2019 Carbon in Earth's fluid envelopes - the atmosphere, biosphere, and hydrosphere, plays a fundamental role in our planet's climate system and a central role in biology, the environment, and the economy of earth system. The source and original quantity of carbon in our planet is uncertain, as are the identities and relative importance of early chemical processes associated with planetary differentiation. Numerous lines of evidence point to the early and continuing exchange of substantial carbon between Earth's surface and its interior, including diamonds, carbon-rich mantle-derived magmas, carbonate rocks in subduction zones and springs carrying deeply sourced carbon-bearing gases. Thus, there is little doubt that a substantial amount of carbon resides in our planet's interior. Yet, while we know it must be present, carbon's forms, transformations and movements at conditions relevant to the interiors of Earth and other planets remain uncertain and untapped. Volume highlights include: - Reviews key, general topics, such as carbonate minerals, the deep carbon cycle, and carbon in magmas or fluids - Describes new results at the frontiers of the field with presenting results on carbon in minerals, melts, and fluids at extreme conditions of planetary interiors - Brings together emerging insights into carbon's forms, transformations and movements through study of the dynamics, structure, stability and reactivity of carbon-based natural materials - Reviews emerging new insights into the properties of allied substances that carry carbon, into the rates of chemical and physical transformations, and into the complex interactions between moving fluids, magmas, and rocks to the interiors of Earth and other planets - Spans the various chemical redox states of carbon, from reduced hydrocarbons to zero-valent diamond and graphite to oxidized CO₂ and carbonates - Captures and synthesizes the exciting results of recent, focused efforts in an emerging scientific discipline - Reports advances over the last decade that have led to a major leap forward in our understanding of carbon science - Compiles the range of methods that can be tapped tap from the deep carbon community, which includes experimentalists, first principles theorists, thermodynamic modelers and geodynamicists - Represents a reference point for future deep carbon science research Carbon in Planetary Interiors will be a valuable resource for researchers and students who study the Earth's interior. The topics of this volume are interdisciplinary, and therefore will be useful to professionals from a wide variety of fields in the Earth Sciences, such as mineral physics, petrology, geochemistry, experimentalists, first principles theorists, thermodynamics, material science, chemistry, geophysics and geodynamics.

Life Feb 15 2022 By one of Britain's most gifted scientists: a magnificently daring and compulsively readable account of life on Earth (from the "big bang" to the advent of man), based entirely on the most original of all sources--the evidence of fossils. With excitement and driving intelligence, Richard Fortey guides us from the barren globe spinning in space, through the very earliest signs of life in the sulphurous hot springs and volcanic

vents of the young planet, the appearance of cells, the slow creation of an atmosphere and the evolution of myriad forms of plants and animals that could then be sustained, including the magnificent era of the dinosaurs, and on to the last moment before the debut of Homo sapiens. Ranging across multiple scientific disciplines, explicating in wonderfully clear and refreshing prose their findings and arguments--about the origins of life, the causes of species extinctions and the first appearance of man--Fortey weaves this history out of the most delicate tracteries left in rock, stone and earth. He also explains how, on each aspect of nature and life, scientists have reached the understanding we have today, who made the key discoveries, who their opponents were and why certain ideas won. Brimful of wit, fascinating personal experience and high scholarship, this book may well be our best introduction yet to the complex history of life on Earth. A Book-of-the-Month Club Main Selection With 32 pages of photographs

The Story of Earth Feb 27 2023 Hailed by The New York Times for writing "with wonderful clarity about science . . . that effortlessly teaches as it zips along," nationally bestselling author Robert M. Hazen offers a radical new approach to Earth history in this intertwined tale of the planet's living and nonliving spheres. With an astrobiologist's imagination, a historian's perspective, and a naturalist's eye, Hazen calls upon twenty-first-century discoveries that have revolutionized geology and enabled scientists to envision Earth's many iterations in vivid detail—from the mile-high lava tides of its infancy to the early organisms responsible for more than two-thirds of the mineral varieties beneath our feet. Lucid, controversial, and on the cutting edge of its field, *The Story of Earth* is popular science of the highest order. "A sweeping rip-roaring yarn of immense scope, from the birth of the elements in the stars to meditations on the future habitability of our world." -Science "A fascinating story." -Bill McKibben

Earth! My First 4.54 Billion Years Dec 13 2021 A lighthearted nonfiction picture book about the formation and history of the Earth--told from the perspective of the Earth itself! "Hi, I'm Earth! But you can call me Planet Awesome." Prepare to learn all about Earth from the point-of-view of Earth herself! In this funny yet informative book, filled to the brim with kid-friendly facts, readers will discover key moments in Earth's life, from her childhood more than four billion years ago all the way up to present day. Beloved children's book author Stacy McAnulty helps Earth tell her story, and award-winning illustrator David Litchfield brings the words to life. The book includes back matter with even more interesting tidbits. This title has Common Core connections.

On the Edge of Eternity Nov 12 2021 It is commonly assumed that the creation story of Genesis and its chronology were the only narratives openly available in medieval and early modern Europe and that the discovery of geological time in the eighteenth century came as a momentous breakthrough that shook the faith in the historical accuracy of the Bible. Historians of science, mainstream geologists, and Young Earth creationists alike all share the assumption that the notion of an ancient Earth was highly heterodox in the pre-modern era. The old age of the world is regarded as the offspring of a secularized science. In this book, Ivano Dal Prete radically revises the commonplace history of deep time in Western culture. He argues that the chronology of the Bible always coexisted with alternative approaches that placed the origin of the Earth into a far, undetermined (or even eternal) past. From the late Middle Ages, these notions spread freely not only in universities and among the learned, but even in popular works of meteorology, geology, literature, and art that made them easily accessible to a vernacular and scientifically illiterate public. Religious authorities did not regard these notions as particularly problematic, let alone heretical. Neither the authors nor their numerous readers thought that holding such views was incompatible with their Christian faith. While the appeal of theories centered on the biblical Flood and on a young Earth gained popularity over the course of the seventeenth century, their more secular alternatives remained vital and debated. Enlightenment thinkers, however, created a myth of a Christian tradition that uniformly rejected the antiquity of the world, as opposed to a new secular science ready to welcome it. Largely unchallenged for almost three centuries, that account solidified over time into a still dominant truism. Based on a wealth of mostly unexplored sources, *On the Edge of Eternity* offers an original and nuanced account of the history of deep time that illuminates the relationship between the history of science and Christianity in the medieval and early modern periods, with lasting implications for Western society.

The Encyclopedia of Early Earth Apr 29 2023 A beautifully illustrated book of imaginary fables about Earth's early--and lost--history. Before our history began, another--now forgotten--civilization thrived. The people who roamed Early Earth were much like us: curious, emotional, funny, ambitious, and vulnerable. In this series of illustrated and linked tales, Isabel Greenberg chronicles the explorations of a young man as he paddles from his home in the North Pole to the South Pole. There, he meets his true love, but their romance is ill-fated. Early Earth's unusual and finicky polarity means the lovers can never touch. As intricate and richly imagined as the work of Chris Ware, and leavened with a dry wit that rivals Kate Beaton's in *Hark! A Vagrant*, Isabel Greenberg's debut will be a welcome addition to the thriving graphic novel genre.

Origin of the Earth and Moon Dec 01 2020 Since the beginning of civilization, the origins of the Earth and Moon have been the subjects of continuing interest, speculation, and enquiry. These are also among the most challenging of all scientific problems. They are, perhaps to a unique degree, interdisciplinary, having attracted the attention of philosophers, astronomers, mathematicians, geologists, chemists, and physicists. A large and diverse literature has developed, far beyond the capacity of individuals to assimilate adequately. Consequently, most of those who attempt to present review-syntheses in the area tend to reflect the perspectives of their own particular disciplines. The present author's approach is that of a geochemist, strongly influenced by the basic philosophy of Harold Urey. Whereas most astronomical phenomena are controlled by gravitational and magnetic fields, and by nuclear interactions, Urey (1952) emphasized that the formation of the solar system occurred in a pressure-temperature regime wherein the chemical properties of matter were at least as important as those of gravitational and magnetic fields. This was the principal theme of his 1952 book, "The Planets," which revolutionized our approach to this subject. In many subsequent papers, Urey strongly emphasized the importance of meteorites in providing critical evidence of chemical conditions in the primordial solar nebula, and of the chemical fractionation processes which occurred during formation of the terrestrial planets. This approach has been followed by most subsequent geochemists and cosmochemists.

Evolution of Early Earth's Atmosphere, Hydrosphere, and Biosphere Jul 20 2022 "The history of Earth's early atmosphere, hydrosphere, and biosphere, from Hadean through Proterozoic time, is one of geology's enduring puzzles. Ore deposits provide important insights into this history because they contain elements and minerals that are highly sensitive to the geochemical environment in which they form. Just what these minerals tell us remains a matter of considerable debate, however. When and how did life develop, an oxygen-rich atmosphere form, and sulfate dominate the ocean? This volume contains reports on these questions from both sides of the aisle for iron and manganese formations, uranium paleoplacers and hydrothermal deposits, and exhalative sulfides and oxides."--Publisher's website.

Early Earth Systems May 18 2022 *Early Earth Systems* provides a complete history of the Earth from its beginnings to the end of the Archaean. This journey through the Earth's early history begins with the Earth's origin, then examines the evolution of the mantle, the origin of the continental crust, the origin and evolution of the Earth's atmosphere and oceans, and ends with the origin of life. Looks at the evidence for the Earth's very early differentiation into core, mantle, crust, atmosphere and oceans and how this differentiation saw extreme interactions within the Earth system. Discusses Archaean Earth processes within the framework of the Earth System Science paradigm, providing a qualitative assessment of the principal reservoirs and fluxes in the early Earth. "The book would be perfect for a graduate-level or upper level undergraduate course on the early Earth. It will also serve as a great starting point for researchers in solid-Earth geochemistry who want to know more about the Earth's early atmosphere and biosphere, and vice versa for low temperature geochemists who want to get a modern overview of the Earth's interior." Geological Magazine, 2008

Processes on the Early Earth Feb 21 2020 "This Special Paper presents a collection of 19 papers contributed to a joint Field Forum organized by the Geological Society of America and the Geological Society of South Africa in July 2004 in the Barberton Greenstone Belt and the Vredefort Dome, South Africa. The papers cover a wide variety of themes, including Archean and Proterozoic crust formation and geodynamics (with an appraisal of evidence of Archean subduction processes); the significance of impacts in the evolution of the early Earth's crust; traces of early life in Archean environments of Australia and South Africa and related studies of depositional environments; and processes affecting the giant Witwatersrand gold deposit."--Publisher's website.

The Life and Death of Planet Earth Jul 28 2020 Planet Earth is middle-aged. Science has worked hard to piece together the story of the evolution of our world up to this point, but only recently have we developed the understanding and the tools to describe the entire life cycle of a planet. Ward

and Brownlee, a geologist and an astronomer respectively, combine their knowledge of how the critical sustaining systems of our planet evolve through time with their understanding of the life cycles of stars and solar systems, to tell the story of the second half of Earth's life. The process of evolution will essentially reverse itself: life as we know it will subside until only the simplest forms remain. Eventually, they too will disappear. The oceans will evaporate, the atmosphere will degrade, and, as the sun slowly expands, Earth itself will eventually meet a fiery end. --From publisher description.

The Cosmic Zoo Apr 24 2020 Are humans a galactic oddity, or will complex life with human abilities develop on planets with environments that remain habitable for long enough? In a clear, jargon-free style, two leading researchers in the burgeoning field of astrobiology critically examine the major evolutionary steps that led us from the distant origins of life to the technologically advanced species we are today. Are the key events that took life from simple cells to astronauts unique occurrences that would be unlikely to occur on other planets? By focusing on what life does - its functional abilities - rather than specific biochemistry or anatomy, the authors provide plausible answers to this question. Systematically exploring the various pathways that led to the complex biosphere we experience on planet Earth, they show that most of the steps along that path are likely to occur on any world hosting life, with only two exceptions: One is the origin of life itself - if this is a highly improbable event, then we live in a rather "empty universe". However, if this isn't the case, we inevitably live in a universe containing a myriad of planets hosting complex as well as microbial life - a "cosmic zoo". The other unknown is the rise of technologically advanced beings, as exemplified on Earth by humans. Only one technological species has emerged in the roughly 4 billion years life has existed on Earth, and we don't know of any other technological species elsewhere. If technological intelligence is a rare, almost unique feature of Earth's history, then there can be no visitors to the cosmic zoo other than ourselves. Schulze-Makuch and Bains take the reader through the history of life on Earth, laying out a consistent and straightforward framework for understanding why we should think that advanced, complex life exists on planets other than Earth. They provide a unique perspective on the question that puzzled the human species for centuries: are we alone?

Encyclopedia of Paleoclimatology and Ancient Environments Jun 07 2021 One of Springer's Major Reference Works, this book gives the reader a truly global perspective. It is the first major reference work in its field. Paleoclimate topics covered in the encyclopedia give the reader the capability to place the observations of recent global warming in the context of longer-term natural climate fluctuations. Significant elements of the encyclopedia include recent developments in paleoclimate modeling, paleo-ocean circulation, as well as the influence of geological processes and biological feedbacks on global climate change. The encyclopedia gives the reader an entry point into the literature on these and many other groundbreaking topics.

Earth's Oldest Rocks Apr 05 2021 Earth's Oldest Rocks provides a comprehensive overview of all aspects of early Earth, from planetary accretion through to development of protocratons with depleted lithospheric keels by c. 3.2 Ga, in a series of papers written by over 50 of the world's leading experts. The book is divided into two chapters on early Earth history, ten chapters on the geology of specific cratons, and two chapters on early Earth analogues and the tectonic framework of early Earth. Individual contributions address topics that range from planetary accretion, a review of Earth meteorites, significance and composition of Hadean protocrust, composition of Archaean mantle and deep crust, all aspects of the geology of Paleoproterozoic cratons, composition of Archean oceans and hydrothermal environments, evidence and geological settings of early life, early Earth analogues from Venus and New Zealand, and a tectonic framework for early Earth. * Contains comprehensive reviews of areas of ancient lithosphere on Earth, of planetary accretion processes, and of meteorites * Focuses on specific aspects of early Earth, including oldest putative life forms, evidence of the composition of the ancient atmosphere-hydrosphere, and the oldest evidence for subduction-accretion * Presents an overview of geological processes and model of the tectonic framework on early Earth

Ancient Supercontinents and the Paleogeography of Earth May 26 2020 Ancient Supercontinents and the Paleogeography of Earth offers a systematic examination of Precambrian cratons and supercontinents. Through detailed maps of drift histories and paleogeography of each continent, this book examines topics related to Earth's tectonic evolution prior to Pangea, including plate kinematics, orogenic development, and paleoenvironments. Additionally, this book discusses the methodologies used, principally paleomagnetism and tectonostratigraphy, and addresses geophysical topics of mantle dynamics and geodynamo evolution over billions of years. Structured clearly with consistent coverage for Precambrian cratons, this book combines state-of-the-art paleomagnetic and geochronologic data to reconstruct the paleogeography of the Earth in the context of major climatic events such as global glaciations. It is an ideal, up-to-date reference for geoscientists and geographers looking for answers to questions surrounding the tectonic evolution of Earth. Provides robust paleogeographies of Precambrian cratons based on high-quality paleomagnetic and geochronologic data and critically tested by global geological datasets Includes links to updated databases for the Precambrian such as PALEOMAGIA and the Global Paleomagnetic Database (GPMDB) Presents full-color maps of the drift histories of each continent as well as their paleogeographies Discusses key questions regarding continental drift, the supercontinent cycle, and the geomagnetic dipole hypothesis and analyzes paleogeography in the context of Earth's holistic evolution

The Mathematics of the Heavens and the Earth Apr 17 2022 The Mathematics of the Heavens and the Earth is the first major history in English of the origins and early development of trigonometry. Glen Van Brummelen identifies the earliest known trigonometric precursors in ancient Egypt, Babylon, and Greece, and he examines the revolutionary discoveries of Hipparchus, the Greek astronomer believed to have been the first to make systematic use of trigonometry in the second century BC while studying the motions of the stars. The book traces trigonometry's development into a full-fledged mathematical discipline in India and Islam; explores its applications to such areas as geography and seafaring navigation in the European Middle Ages and Renaissance; and shows how trigonometry retained its ancient roots at the same time that it became an important part of the foundation of modern mathematics. The Mathematics of the Heavens and the Earth looks at the controversies as well, including disputes over whether Hipparchus was indeed the father of trigonometry, whether Indian trigonometry is original or derived from the Greeks, and the extent to which Western science is indebted to Islamic trigonometry and astronomy. The book also features extended excerpts of translations of original texts, and detailed yet accessible explanations of the mathematics in them. No other book on trigonometry offers the historical breadth, analytical depth, and coverage of non-Western mathematics that readers will find in The Mathematics of the Heavens and the Earth.

Early Stages of Earth History Oct 11 2021

Rare Earth Aug 09 2021 What determines whether complex life will arise on a planet, or even any life at all? Questions such as these are investigated in this groundbreaking book. In doing so, the authors synthesize information from astronomy, biology, and paleontology, and apply it to what we know about the rise of life on Earth and to what could possibly happen elsewhere in the universe. Everyone who has been thrilled by the recent discoveries of extrasolar planets and the indications of life on Mars and the Jovian moon Europa will be fascinated by Rare Earth, and its implications for those who look to the heavens for companionship.

Introduction to Geology: Earth history. pt. 1. Early stages of earth history. pt. 2. Later stages of earth history Aug 21 2022

Life on a Young Planet Jun 26 2020 Knoll explores the deep history of life from its origins on a young planet to the incredible Cambrian explosion, with the very latest discoveries in paleontology integrated with emerging insights from molecular biology and earth system science. 100 illustrations.

The Early Evolution of the Atmospheres of Terrestrial Planets Sep 29 2020 "The Early Evolution of the Atmospheres of Terrestrial Planets" presents the main processes participating in the atmospheric evolution of terrestrial planets. A group of experts in the different fields provide an update of our current knowledge on this topic. Several papers in this book discuss the key role of nitrogen in the atmospheric evolution of terrestrial planets. The earliest setting and evolution of planetary atmospheres of terrestrial planets is directly associated with accretion, chemical differentiation, outgassing, stochastic impacts, and extremely high energy fluxes from their host stars. This book provides an overview of the present knowledge of the initial atmospheric composition of the terrestrial planets. Additionally it includes some papers about the current exoplanet discoveries and provides additional clues to our understanding of Earth's transition from a hot accretionary phase into a habitable world. All papers included were reviewed by experts in their respective fields. We are living in an epoch of important exoplanet discoveries, but current properties of these

exoplanets do not match our scientific predictions using standard terrestrial planet models. This book deals with the main physio-chemical signatures and processes that could be useful to better understand the formation of rocky planets.

[The Early History of the Earth](#) Mar 04 2021

[Mission to Planet Earth](#) Jun 19 2022

[Ancient Earth, Ancient Skies](#) Oct 23 2022 Planet Earth and the other bodies of the Solar System are 4.5 billion years old. They reside in a galaxy (the Milky Way Galaxy) that is 12-14 billion years old, and are part of a universe that is 13-15 billion years old. In *Ancient Earth, Ancient Skies*, G. Brent Dalrymple, a geologist and widely recognized expert on the age of Earth, reviews the evidence that has led scientists to these conclusions and describes the methods by which this evidence has been gathered.

[The Early Earth](#) Sep 22 2022

Astrobiology of Earth May 06 2021 The study of life in our universe has been given the name 'astrobiology'. It is a relatively new subject, but not a new discipline since it brings together several mature fields of science including astronomy, geology, biology, and climatology. An understanding of the singular conditions that allowed the only example of life that we know exists to emerge and survive on our turbulent planet is essential if we are to seek answers to two fundamental questions facing humanity: will life (and especially human life) continue on Earth, and does life exist elsewhere in the universe? Astrobiology of Earth adopts a unique approach that differs from most texts in the field which focus on the possibility of extraterrestrial life. In contrast, the central theme of this book is the fortuitous combination of numerous cosmic factors that together produced the special environment which enabled the emergence, persistence and evolution of life on our own planet, culminating in humanity. This environment has been subject to constant and chaotic change during life's 3.6 billion year history. The geologically very recent appearance of humans and their effect on the biosphere is discussed in relation to its deterioration as well as climate change. The search for extraterrestrial life is considered with a view to the suggestion that humans may escape a depleted Earth by colonizing the universe. This book contributes to our understanding of astrobiology from the perspective of life on Earth and especially human welfare and survival. Astronomical and geological phenomena are related in turn to their biological relevance and impact. This introductory text assumes little or no prior knowledge of more specialized scientific fields and is designed for undergraduate and graduate level students taking related courses in departments of biology, earth science/geology, and environmental science. It will also serve as a useful biology primer for astronomy majors.

[Deep Carbon](#) Oct 31 2020 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.

[Earth Clock](#) Dec 25 2022 Our planet has been spinning in the blackness of Space for 4.5 billion years. People have only been around for a tiny part of it. But what happened before we arrived on the scene? Before animals, dinosaurs and even trees? Imagine if we could discover Earth's history in one day... Starting the clock from the formation of the Earth, we can discover each significant moment in time on the clock, counting down to midnight. *Earth Clock* covers the most interesting and high-impact moments of our planet's geological history with stunning, detailed illustrations, while charting the evolution of life on Earth, from ancient single-celled organisms to the species we know today, until modern humans appear - at just four seconds to midnight. What will tomorrow bring?

The Early Earth Jan 26 2023 *The Early Earth: Accretion and Differentiation* provides a multidisciplinary overview of the state of the art in understanding the formation and primordial evolution of the Earth. The fundamental structure of the Earth as we know it today was inherited from the initial conditions 4.56 billion years ago as a consequence of planetesimal accretion, large impacts among planetary objects, and planetary-scale differentiation. The evolution of the Earth from a molten ball of metal and magma to the tectonically active, dynamic, habitable planet that we know today is unique among the terrestrial planets, and understanding the earliest processes that led to Earth's current state is the essence of this volume. Important results have emerged from a wide range of disciplines including cosmochemistry, geochemistry, experimental petrology, experimental and theoretical mineral physics and geodynamics. The topics in this volume include: Condensation of primitive objects in the solar nebula, planetary building blocks Early and late accretion and planetary dynamic modeling Primordial differentiation, core formation, Magma Ocean evolution and crystallization This volume will be a valuable resource for graduate students, academics, and researchers in the fields of geophysics, geochemistry, cosmochemistry, and planetary science.

[The Rejection of Continental Drift](#) Mar 24 2020 In the early 20th century, American earth scientists vociferously opposed the new -- and highly radical -- notion of continental drift. Yet 50 years later the same idea was heralded as a major scientific breakthrough, and today continental drift is accepted as a scientific fact. This insightful book, based on archival sources, looks at why American geologists initially rejected the idea so adamantly while their counterparts in Europe were relatively receptive.

[Astrobiology and Cuatro Ciénegas Basin as an Analog of Early Earth](#) Jan 14 2022 Astrobiology not only investigates how early life took hold of our planet but also life on other planets - both in our Solar System and beyond - and their potential for habitability. The book takes readers from the scars on planetary surfaces made by space rocks to the history of the Solar System narrated by those space rocks as well as exoplanets in other planetary systems. But the true question is how life arose here or elsewhere. Modern comparative genomics has revealed that Darwin was correct; a set of highly conserved genes and cellular functions indicate that all life is related by common ancestry. The Last Universal Common Ancestor or LUCA sits at the base of the Tree of Life. However, once that life took hold, it started to diversify and form complex microbial communities that are known as microbial mats and stromatolites. Due to their long evolutionary history and abundance on modern Earth, research on the biological, chemical and geological processes of stromatolite formation has provided important insights into the field of astrobiology. Many of these microbialite-containing ecosystems have been used as models for astrobiology, and NASA mission analogs including Shark Bay, Pavilion and Kelly Lakes. Modern microbialites represent natural laboratories to study primordial ecosystems and provide proxies for how life could evolve on other planets. However, few viral metagenomic studies (i.e., viromes) have been conducted in microbialites, which are not only an important part of the community but also mirror its biodiversity. This book focuses on particularly interesting sites such as Andean lake microbialites, a proxy of early life since they are characterized by very high UV light, while Alchichica and Bacalar lakes are characterized by high-salt and oligotrophic waters that nurture stromatolites. However, it is only the oasis of Cuatro Ciénegas Basin in México that stored past life in its marine sediments of the Sierra de San Marcos. This particular Sierra has a magmatic pouch that moves the deep aquifer to the surface in a cycle of sun-drenched life and back to the depths of the magmatic life in an ancient cycle that now is broken by the overexploitation of the surface water as well as the deep aquifer in order to irrigate alfalfa in the desert. The Anthropocene, the era of human folly, is killing this unique time machine and with it the memory of the planet.

The First Book of the Earth Aug 29 2020 This is an elementary study of our planet from a geological perspective. Originally published in 1958, it covers the subject of how the earth was formed, the composition and structure of the earth, including minerals, rocks, and water, volcanoes, mountains, rivers, glaciers, fossils, dinosaurs and life forms. An index is included.

Ancient Earth Journal: The Early Cretaceous Feb 03 2021 Written and illustrated in the style of a naturalist's notebook, *The Early Cretaceous* brings readers closer to prehistoric life than ever before.