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Fluids in the Earth's Crust - W. S. Fyfe - 1978

Physical modelling of the movement of geological fluids in the earth's crust with application to magma transport, storage and degassing - Thierry Menand - 2013

Fluid Physics in Geology - David Jon Furbish - 1997-01-09

Fluid Physics in Geology is a fluid mechanics text for geologists; it provides an introductory treatment of the physical and dynamical behaviour of fluids, aimed at students who need to understand fluid behaviour and motion in the context of a wide variety of geological problems.

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Metamorphism and Fluid Processes in the Earth's Crust - B. W. D. Yardley - 1993

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For much of the 20th century, scientific contacts between the Soviet Union and western countries were few and far between, and often super ficial. In earth sciences, ideas and data were slow to cross the Iron Curtain, and there was considerable mutual mistrust of diverging scient ific philosophies. In geochemistry, most western scientists were slow to appreciate the advances being made in the Soviet Union by os. Korz hinskii, who put the study of ore genesis on a rigorous thermodynamic basis as early as the 1930s. Korzhinskii appreciated that the most fun damental requirement for the application of quantitative models is data on mineral and fluid behaviour at the elevated pressures and temper atures that occur in the Earth's crust. He began the work at the Institute of Experimental Mineralogy (IEM) in 1965, and it became a separate establishment of the Academy of Sciences in Chernogolovka in 1969. The aim was to initiate a major programme of high P-T experimental studies to apply physical chemistry and thermodynamics to resolving geological problems. For many years, Chernogolovka was a closed city, and western scient ists were unable to visit the laboratories, but with the advent of peres troika in 1989, the first groups of visitors were eagerly welcomed to the IEM. What they found was an experimental facility on a massive scale, with 300 staff, including 80 researchers and most of the rest pro viding technical support.

Crustal Permeability

Crustal Permeability is the primary control on fluid flow in the Earth's crust and is key to a surpris ingly wide range of geological processes, because it controls the advection of heat and solutes and the generation of anomalous pore pressures. The practical importance of permeability - and the potential for large, dynamic changes in permeability - is highlighted by ongoing issues associated with hydraulic fracturing for hydrocarbon production ("fracking"), enhanced geothermal systems, and geologic carbon sequestration. Although there are thousands of research papers on crustal permeability, this is the first book-length treatment. This book bridges the historical dichotomy between the hydrogeologic perspective of permeability as a static material property and the perspective of other Earth scientists who have long recognized permeability as a dynamic parameter that changes in response to tectonics, fluid production, and geochemical reactions.

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Fluid Flow Through a Large Vertical Crack in the Earth's Crust - Show-Peng Chang - 1977

Carbon in Earth's Interior - Craig E. Manning - 2020-04-03
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 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

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The Earth's Crust - J. G. Heacock - 1977
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Metasomatism and the Chemical Transformation of Rock - Daniel Harlow - 2012-08-14
Fluid-aided mass transfer and subsequent mineral re-equilibration are the two defining features of metasomatism and must be present in order for metamorphism to occur. Coupled with igneous and tectonic processes, metasomatism has played a major role in the formation of the Earth’s continental and oceanic crust and lithospheric mantle as well as in their evolution and subsequent stabilization. Metasomatic processes can include ore mineralization, metasomatically induced alteration of oceanic lithosphere, mass transport in and alteration of
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Hydrocarbon Fluid Inclusions in Petroliferous Basins - Vivekanandan Nandakumar - 2021-06-24
Hydrocarbon Fluid Inclusions (HCFIs) in sedimentary rocks, particularly the wafer preparation techniques to visualize HCFIs, its distinction from aqueous inclusions, petrographic approaches to HCFIs, microthermometric observations on HCFIs, fluorescence emission spectra and Raman spectra of HCFIs, and their interpretations for the petroleum industry. The book features case studies from the Mumbai and Kerala Konkan Basins of the Western Offshore of India - two representative basins where new, non-destructive, fluid inclusion techniques were tested. This book is essential reading for students of petroleum geology and those working in the oil and gas industry. Helps readers to identify Hydrocarbon Fluid Inclusions (HCFIs) in sedimentary basins Covers how to determine the oil window, API gravity and chemical constituents in HCFIs Includes case studies on key offshore basins

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Fluid Movements — Element Transport and the Composition of the Deep Crust - David Bridgwater - 2012-12-06
Many geologists have an equivocal attitude to fluid movements within the crust and the associated changes in the chemical and physical properties of crustal rocks. The controversies earlier this century between the “soaks” and the “postifs” memorably summarised by H. H. Read (1957) in The Granite Controversy have largely been resolved. Few would now advocate the formation of large granitic bodies by in situ transformation of pre-existing crust as the result of the passage of aches without the formation of a granitic melt. To many geologists fluid transport and metasomatism have become slightly suspect processes which at the most locally disturb the primary geochemical and isotopic signatures. While there is common agreement that there are marked differences in the composition of the lower and upper crust, the role of fluid movement as one of the controls of this differentiation is often neglected in favour of suggested primary differences in the composition of igneous rocks emplaced at different depths. Selective fluid transport however provides many geologists with their livelihood. Without the secondary concentration of commercially important elements by fluids within the crust the mining industry, geological science and human activities based on their products would be very different.

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Fluid Flow Through a Large Vertical Crack in the Earth's Crust - - 1976
In this investigation, we are primarily concerned with modeling fluid flow through vertical cracks that were created for the purpose of extracting heat from hot, dry rock masses. The basic equation for the two-dimensional problem of fluid flow through a crack is presented and an approximate solution is found. The basic equation is a non-linear, Cauchy-singular integro-differential equation. Moderately simple formulae for the crack opening displacement and the effective pressure difference between the crack tips are derived. The results are valid for arbitrary vertical cracks, provided that the fluid injection and removal points are not placed too close to the crack tips. (A more complete treatment of this problem is given by us in a paper to appear in the Journal of Geophysical Research.) There are two corrections that can be made to our results. One of these is the influence of the earth's crust. Another correction takes into account the decrease in the vertical pressure produced at the crack walls by the fluid pressure because the crack walls are not vertical when the crack is filled with fluid. It can be shown (Weertman and Chang, Ref. 6) that both of these corrections are negligibly small. We conclude from this
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Geochemistry of Crustal Fluids - Fluids in the Crust and Chemical Fluxes at the Earth's Surface - 2002

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Existence of Free Boundary Flows in Fluid Dynamics. The Viscosity of the Earth's Crust from Data at Lake Bonneville - Gerald W. Grube - 1972

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The Noble Gases as Geochemical Tracers - Pete Burnard - 2012-12-15

The twelve chapters of this volume aim to provide a complete manual for using noble gases in terrestrial geochemistry, covering applications which range from high temperature processes deep in the earth's interior to tracing climatic variations using noble gases trapped in ice cores, groundwater and modern sediments. Other chapters cover noble gases in crustal (aqueous, CO2 and hydrocarbon) fluids and laboratory techniques for determining noble gas solubilities and diffusivities under geologically relevant conditions. Each chapter deals with the fundamentals of the analysis and interpretation of the data, detailing sampling and sampling strategies, techniques for analysis, sources of error and their estimation, including data treatment and data interpretation using recent case studies.

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The book summarizes the knowledge and experiences concerning the role of halogens during various geochemical processes, such as diagenesis, ore-formation, magma evolution, metasomatism, mineralization, and metamorphism in the crust and mantle of the Earth. It comprises the role of halogens in other terrestrial worlds upon the basis of our current understanding regarding how halogens contribute to the geochemical/geophysical evolution and stability of terrestrial worlds overall.


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Influence of Fluid Injection on Stress in the Earth's Crust - Paul Adams Witherspoon - 1973

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The living ocean - 1995

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Earth Crust - Muhammad Nawaz - 2019-11-13

The book aims to cover the basics of the architecture, structure, evolution, and dynamics of the Earth's crust through an anthology of contributed chapters that will enlighten readers about the various aspects of the Earth's crust, including, existence, development, and sustainability of our modern lifestyles on its surface.

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Geochemical and Biogeochemical Reaction Modeling - Craig M. Bethke - 2007-12-06

This book provides a comprehensive overview of reaction processes in the Earth's crust and on its surface, both in the laboratory and in the field. A clear exposition of the underlying equations and calculation techniques is balanced by a large number of fully worked examples. The book uses The Geochemist's Workbench® modeling software, developed by the author and already installed at over 1000 universities and research facilities worldwide. Since publication of the first edition, the field of reaction modeling has continued to grow and find increasingly broad application. In particular, the description of microbial activity, surface chemistry, and redox chemistry within reaction models has become broader and more rigorous. These areas are covered in detail in this new edition, which was originally published in 2007. This text is written for graduate students and academic researchers in the fields of geochemistry, environmental engineering, contaminant hydrology, geoecmiochemistry, and numerical modeling.

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Fluid Flow and Transport in Rocks - B. Jamtveit - 1996-09-30

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Fluids in the Earth's crust can move by creating and flowing through fractures, in a process called 'hydraulic fracturing'. The tip-line of such fluid-filled fractures grows at locations where stress is larger than the strength of the rock. Where the tip stress vanishes, the fracture closes and the fluid-front retreats. If stress gradients exist on the fracture's walls, induced by fluid/rock density contrasts or topographic stresses, this results in an asymmetric shape and growth of the fracture, allowing for the contained batch of fluid to propagate through the crust. The state-of-the-art analytical and numerical methods to simulate fluid-filled fracture propagation are two-dimensional (2D). In this work I extend these to three dimensions (3D). In my analytical method, I approximate the propagating 3D fracture as a penny-shaped crack that is influenced by both an internal pressure and stress gradients. In addition, I develop a numerical method to model propagation where curved fractures can be simulated as a mesh of triangular

### Hydrogeology of Crystalline Rocks

**B. Jantveit** - 1996-09-30

This book represents the proceedings of the 9th written by a very active group of physicists at Kongsberg seminar, held at the Norwegian the University of Oslo - physicists interested in Museum located in the city of Kongsberg about complex systems in general and geo-like systems 70 km Southwest of Oslo. The Kongsberg district in particular, is known for numerous Permian vein deposits of The content of the book is organized into three native silver, and mining activity in the area lasted major parts following the introductory chapter. For more than 300 years, finally ceasing in 1957. Chapters 2 to 7 primarily treat the role of fluids The previous eight Kongsberg seminars were in specific geological environments, ranging from focused on ore-forming processes and all of these sedimentary basins (Chapters 2-3) to contact were organized by Professor Arne Bjørlykke, now metamorphic/hydrothermal scenarios (Chapters director of the Norwegian Geological Survey. 4-5) and regional metamorphic settings (Chapters Since process-oriented research tends to break 6-7). The following four chapters (8-11) focus down the traditional barriers between the different on various properties of fluid-rock systems that geological disciplines, this seminar has always are critical in controlling flow and transport been a meeting point for people with a variety through rocks. These include: mineral solubility of geological backgrounds.

**Hydrogeology of Crystalline Rocks**

**I. Stober** - 2013-04-18

Hydrogeology of Crystalline Rocks deals with deep groundwater in the granite and gneiss basement of the continents. It has become evident during the past years that highly mineralized water is present in an interconnected fracture network of the basement. Thus, the upper part of the crust of the continents can be viewed as an aquifer and investigated with tools common in hydrogeology. This book presents accounts on water-conducting features of crystalline rocks and summarizes the hydraulic properties of the basement. The volume includes reviews, new data and research on the often remarkable chemical composition of deep groundwater. Microbial processes in the deep basement aquifer are probably more important than previously thought. Two contributions focus on this recent extension of research of the biosphere to greater depth in the Earth. This book represents the first multidisciplinary and integrated account of deep groundwater hydrology in crystalline basement. It is of interest to hydrologists and hydrogeologists working with water in crystalline rocks, but also to solid earth geophysicists, geochemists and petropists with an interest in fluids in the crust. Scientists involved in nuclear waste disposal programs and geothermal energy development will find a wealth of stimulating ideas in this volume.

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**Physics of the Earth's Crust**

Osmond Fisher - 1881

**An Analytical and Numerical Analysis of Fluid-filled Crack Propagation in Three Dimensions**

Timothy Davis - 2020

Fluids in the Earth's crust can move by creating and flowing through fractures, in a process called 'hydraulic fracturing'. The tip-line of such fluid-filled fractures grows at locations where stress is larger than the strength of the rock. Where the tip stress vanishes, the fracture closes and the fluid-front retreats. If stress gradients exist on the fracture's walls, induced by fluid/rock density contrasts or topographic stresses, this results in an asymmetric shape and growth of the fracture, allowing for the contained batch of fluid to propagate through the crust. The state-of-the-art analytical and numerical methods to simulate fluid-filled fracture propagation are two-dimensional (2D). In this work I extend these to three dimensions (3D). In my analytical method, I approximate the propagating 3D fracture as a penny-shaped crack that is influenced by both an internal pressure and stress gradients. In addition, I develop a numerical method to model propagation where curved fractures can be simulated as a mesh of triangular
Hydrothermal processes on Earth have played an important role in the evolution of our planet. These processes link the lithosphere, hydrosphere and biosphere in continuously evolving dynamic systems. Terrestrial hydrothermal processes have been active since water condensed to form the hydrosphere, most probably from about 4.4 Ga. The circulation of hot aqueous solution (hydrothermal systems) at, and below, the Earth’s surface is ultimately driven by magmatic heat. This book presents an in-depth review of hydrothermal processes and systems that form beneath the oceans and in intracontinental rifts, continental margins and magmatic arcs. The interaction of hydrothermal fluids with rockwalls, the hydrosphere and the biosphere, together with changes in their composition through time and space, contribute to the formation of a wide range of mineral deposit types and associated wallrock alteration. On Earth, sites of hydrothermal activity support varied ecosystems based on a range of chemotrophic microorganisms both at surface and in the subsurface. This book also provides an overview of hydrothermal systems associated with meteorite impacts and explores the possibility that hydrothermal processes operate on other terrestrial planets, such as Mars, or satellites of the outer planets such as Titan and Europa. Possible analogues of extraterrestrial putative hydrothermal processes pose the intriguing question of whether primitive life, as we know it, may exist or existed in these planetary bodies. Audience: This volume will be of interest to scientists and researchers in geosciences and life sciences departments, as well as to professionals and scientists involved in mining and mineral exploration.

Deep Carbon - Beth N. Orcutt - 2019-10-31
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.

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