

Subduction Zone Evolution And Deep Slab Structure In The

Accretionary orogens form at convergent plate boundaries and include the supra-subduction zone forearc, magmatic arc and backarc components. They can be broken into retreating and advancing types, based on their kinematic framework and resulting geological character. This volume presents fourteen papers dealing with general aspects of accretion and metamorphism and discuss examples of accretionary orogens and crustal growth through Earth history, from the Archaean to the Cenozoic.

Subduction zones are major sites of volcanism on the Earth. As one crustal plate sinks or is pushed beneath another, hot magma is produced and the resultant magma flux is fundamental to both the thermal evolution and chemical differentiation of the mantle and the Earth itself. To understand these evolutionary processes, we need to understand the physical and chemical consequences of all aspects of the subduction process. In this book, the authors present a simple, current and comprehensive model that explains the dominant geological processes at work in subduction zones. Structuring the book around the model, the authors describe the physical characteristics and geochemical dynamics of subduction zones, arc magma generation, and the dynamics and flow in the mantle. Students and researchers alike will find this book of immense value in understanding this most complex of subjects.

Ultrahigh Pressure Metamorphism (UHPM) is a fast growing discipline that was established 25 years ago after discoveries of high pressure minerals, coesite and diamonds. The current explosion of research on UHPM terranes reflects their significance for understanding large scale mantle dynamics, major elements of plate tectonics such as continental collisions, deep subduction and exhumation, mountains building, geochemical recycling 'from surface to the core', and a deep storage of light elements participating in green-house effects in the atmosphere. This book provides insights into the formation of diamond and coesite at very high pressures and explores new ideas regarding the tectonic setting of this style of

metamorphism. Important, authoritative and comprehensive one-stop resource for the growing ultrahigh pressure metamorphism UHPM research community A forward-looking approach founded upon a detailed historical perspective on UHPM presents the trends in discovery, methodology and theory over the last 25 years, allowing readers to gain a clear understanding of the current trends and the approaches that will shape the science in the future A highly diverse set of articles, covering a wide range of methods and sub-disciplines

The Long-term Evolution of Subduction Zones

New Publications of the Geological Survey

Deep Carbon

Past to Present

Dynamics of the Earth's Evolution

Geology and Tectonics of Subduction Zones: A Tribute to Gaku Kimura

Subduction dynamics has been actively studied through seismology, mineral physics, and laboratory and numerical experiments. Understanding the dynamics of the subducting slab is critical to a better understanding of the primary societally relevant natural hazards emerging from our planetary interior, the megathrust earthquakes and consequent tsunamis. Subduction Dynamics is the result of a meeting that was held between August 19 and 22, 2012 on Jeju island, South Korea, where about fifty researchers from East Asia, North America and Europe met. Chapters treat diverse topics ranging from the response of the ionosphere to earthquake and tsunamis, to the origin of mid-continental volcanism thousands kilometers distant from the subduction zone, from the mysterious deep earthquakes triggered in the interior of the descending slabs, to the detailed pattern of accretionary wedges in convergent zones, from the induced mantle flow in the deep mantle, to the nature of the paradigms of earthquake occurrence, showing that all of them ultimately are due to the subduction process. Volume highlights include: Multidisciplinary research involving geology, mineral physics, geophysics and geodynamics Extremely large-scale numerical models with sliate-of-the art high performance computing facilities Overview of exceptional three-dimensional dynamic representation of the evolution of the Earth interiors and of the earthquake and subsequent tsunami dynamics Global risk assessment strategies in predicting natural disasters This volume is a valuable contribution in earth and environmental sciences that will assist with understanding the mechanisms behind plate tectonics and predicting and mitigating future

natural hazards like earthquakes, volcanoes and tsunamis. Utilizing waveform analysis, we show the subhorizontal leading edge ("toe") of the Wadati-Benioff zone (WBZ) of the Tonga subduction zone displays petrologic and petrofabric anomalies. While it appears connected to the WBZ, sporadic fault plane solutions require a localized stress for the deep seismicity. High P-wave speeds (~3%) are absent in the seismogenic toe, requiring a petrologic anomaly to counteract low temperature, and considerable SH-SV splitting implies an anisotropic petrofabric anomaly. The same observations were previously documented for shallower outboard earthquakes in the transition zone extending over 1,000 km further west. Hence, these shared properties represent stages in deep subduction, the toe preceding a large-scale detachment of lithosphere. Metastable olivine satisfies all available observations, accounts for buoyant lithosphere in the transition zone, discouraging slab penetration, and provides a mechanism for deep seismicity. Rising temperature leaves only a thermal anomaly, as seen south of the toe and elsewhere in the Pacific.

This second edition of the important introductory text for earth scientists has been thoroughly revised and extended. It is required reading for all those interested in learning about the quantitative description of geological problems. It contains chapters on heat flow, sedimentary basin modeling, the mechanics of continental deformation, PT path modeling, geomorphology, mass transfer and more. The book is aimed at the field oriented geologist who wants to begin by learning about the quantitative description of problems. The new edition features yet more illustrations and maps as well as almost 100 corrections of scientific problems.

A Decade of Science Achieved by the Integrated Ocean Drilling Program (IODP)

Subduction Zone Geodynamics

Plate Tectonics, Ophiolites, and Societal Significance of Geology

Ultrahigh-Pressure Metamorphism

The Earth's Heterogeneous Mantle

IFREE Report for ...

Plate Tectonics & Crustal Evolution, Second Edition covers the role of plate tectonics in the geologic past in light of existing geologic evidence, and examples of plate reconstructions. The book discusses the important physical and chemical properties of the crust and upper mantle in terms of models for crustal origin and evolution. The text also describes sea-floor spreading; magma associations; plate tectonics and continental drift. The Phanerozoic orogenic systems and the Precambrian crustal development are also tackled. The book will be invaluable to

students in the earth sciences and to various specialists in the geological sciences.

Felsgestein - Geologie.

Subduction is a major process that plays a first-order role in the dynamics of the Earth. The sinking of cold lithosphere into the mantle is thought by many authors to be the most important source of energy for plates driving forces. It also deeply modifies the thermal and chemical structure of the mantle, producing arc volcanism and is responsible for the release of most of the seismic energy on Earth. There has been considerable achievements done during the past decades regarding the complex interactions between the various processes acting in subduction zones. This volume contains a collection of contributions that were presented in June 2007 in Montpellier (France) during a conference that gave a state of the art panorama and discussed the perspectives about "Subduction Zone Geodynamics". The papers included in this special volume offer a unique multidisciplinary picture of the recent research on subduction zones geodynamics. They are organized into five main topics: Subduction zone geodynamics, Seismic tomography and anisotropy, Great subduction zone earthquakes, Seismogenic zone characterization, Continental and ridge subduction processes. Each of the 13 papers collected in the present volume is primarily concerned with one of these topics. However, it is important to highlight that papers always treat more than one topic so that all are related lighting on different aspects of the complex and fascinating subduction zones geodynamics.

Intra-oceanic Subduction Systems

Proceedings of Workshop XLVI, the 7th U.S.-Japan Seminar on Earthquake Prediction

The Role of Fluids in Terrestrial and Extraterrestrial Processes

Plate Tectonics & Crustal Evolution

Subduction Dynamics

Open-file Report

"This volume honors Eldridge Moores, one of the most accomplished geologists of his generation. The volume starts with a summary of Moores' achievements, along with personal dedications and memories from people who knew him. Leading off the volume's 12 chapters of original scientific contributions is Moores' last published paper that presents an example of the Historical Contingency concept, which suggested that earlier subduction history may result in supra-subduction zone geochemical signatures for some magmas formed in non-subduction environments. Other chapters highlight the societal significance of geology, the petrogenesis of ophiolites, subduction zone processes, orogenic belt evolution, and other topics, covering the globe and intersecting with Moores' interests and influences"--

Recycling of oceanic plate back into the Earth's interior at

subduction zones is one of the key processes in Earth evolution. Volcanic arcs, which form above subduction zones, are the most visible manifestations of plate tectonics, the convection mechanism by which the Earth loses excess heat. They are probably also the main location where new continental crust is formed, the so-called 'subduction factory'. About 400 of modern subduction zones on Earth are intra-oceanic. These subduction systems are generally simpler than those at continental margins as they commonly have a shorter history of subduction and their magmas are not contaminated by ancient sialic crust. They are therefore the optimum locations for studies of mantle processes and magmatic addition to the crust in subduction zones.

Wright (geology, U. of Georgia) and Shervais (geology, Utah State U.) edit selections from a symposium titled "Ophiolites, Batholiths, and Regional Geology: A Session in Honor of Cliff Hopson" held at the Cordilleran Section Meeting of The Geological Society of America in 2005. With contributions from geologists and earth scientists from throughout the United States, the title contains separate sections for papers on the topics of ophiolites, arcs, and batholiths. The publication is illustrated in both black-and-white and color, but contains no index.

How the Relationship Between Subduction and Mantle Dynamics Shapes Slab Evolution at Mid-mantle Depths

The Plate Tectonic Evolution of the Earth

The Development Strategy of Earth Science 2021 to 2030

Seismic Analysis of the Tonga Subduction Zone and Implications on the Thermo-petrologic Evolution of Deep Subduction

Multiscale Seismic Tomography

This sixth volume in the monograph series *Physics and Evolution of the Earth's Interior* presents the problems of the mature evolution of the Earth's interior. It provides comprehensive coverage of the present state of the mantle convection theory. The relations between paleomagnetism, plate tectonics and mantle convection theory are discussed. A more general view of the evolution based on the thermodynamics of irreversible processes is also given. This book will interest geophysicists, geologists, geodesists and planetologists. This book on multiscale seismic tomography, written by one of the leaders in the field, is suitable for undergraduate and graduate students, researchers, and professionals in Earth and planetary sciences who need to broaden their horizons about seismotectonics, volcanism, and interior structure and dynamics of the Earth and Moon. It describes the state-of-the-art in seismic tomography, with emphasis on the new findings obtained by applying tomographic methods in

local, regional, and global scales for understanding the generating mechanism of large and great earthquakes such as the 2011 Tohoku-oki earthquake (Mw 9.0), crustal and upper mantle structure, origin of active arc volcanoes and intraplate volcanoes including hotspots, heterogeneous structure of subduction zones, fate of subducting slabs, origin of mantle plumes, mantle convection, and deep Earth dynamics. The first lunar tomography and its implications for the mechanism of deep moonquakes and lunar evolution are also introduced.

Published by the American Geophysical Union as part of the Special Publications Series. This volume presents the English language translation of L.P. Zonenshain and M.I. Kuzmin's classic text *Paleogeodynamics*, first published in Russian in 1992. The study of paleogeodynamics, or plate tectonics, has had an incredible impact on geological research in the former Soviet Union. The authors of this text were among the first to systematically study and utilize the plate tectonic model in the Soviet Union. Within this book the entire sweep of plate tectonic observation, interpretation and example are presented, including detailed descriptions and analysis related to oceanic ridge structures, geochemistry, plate tectonic processes, seismology, tectonostratigraphy terranes, paleoclimatology, paleomagnetism, reconstruction of past plate motions and global Earth history models. Because Zonenshain and his colleagues at the Shirshov Institute of Oceanography pioneered the quantitatively precise mathematical analysis of past plate and terrane motions, one of the sections is highly mathematical, presenting for the first time their development of reconstruction techniques based upon spherical geometry. The extensive bibliography presents and combines both Russian and English language references. Also unique to this volume are numerous examples taken from the plate tectonic history of portions of the former Soviet Union and from data collected during Soviet oceanographic cruises.

Geodynamics of the Lithosphere

A Tribute to Cliff Hopson

Frontier Research on Earth Evolution

Structural and Rheological Evolution of Subduction Interface Shear Zones : Insights from Exhumed Rocks

**Earth and Life Processes Discovered from Subseafloor Environments
Past, Present and Future of a Habitable Earth**

The Long-term Evolution of Subduction Zones A Modelling

Study Faculteit Aardwetenschappen Universiteit Utrecht Seismic

Analysis of the Tonga Subduction Zone and Implications on the Thermo-petrologic Evolution of Deep Subduction

This perspective of this book views Earth's various layers as a

whole system, and tries to understand how to achieve harmony and sustainable development between human society and nature, with the theme of "habitability of the Earth." This book is one effort at providing an overview of some of the recent exciting advances Chinese geoscientists have made. It is the concerted team effort of a group of researchers from diverse backgrounds to generalize their vision for Earth science in the next 10 years. The book is intended for scholars, administrators of the Science and Technology policy department, and science research funding agencies. This is an open access book.

Subduction zones, one of the three types of plate boundaries, return Earth's surface to its deep interior. Because subduction zones are gently inclined at shallow depths and depress Earth's temperature gradient, they have the largest seismogenic area of any plate boundary. Consequently, subduction zones generate Earth's largest earthquakes and most destructive tsunamis. As tragically demonstrated by the Sumatra earthquake and tsunami of December 2004, these events often impact densely populated coastal areas and cause large numbers of fatalities. While scientists have a general understanding of the seismogenic zone, many critical details remain obscure. This volume attempts to answer such fundamental concerns as why some interplate subduction earthquakes are relatively modest in rupture length (greater than 100 km) while others, such as the great (M greater than 9) 1960 Chile, 1964 Alaska, and 2004 Sumatra events, rupture along 1000 km or more. Contributors also address why certain subduction zones are fully locked, accumulating elastic strain at essentially the full plate convergence rate, while others appear to be only partially coupled or even freely slipping; whether these locking patterns persist through the seismic cycle; and what is the role of sediments and fluids on the incoming plate. Nineteen papers written by experts in a variety of fields review the most current lab, field, and theoretical research on the origins and mechanics of subduction zone earthquakes and suggest further areas of exploration. They consider the composition of incoming plates, laboratory studies concerning sediment evolution during subduction and fault frictional properties, seismic and geodetic studies, and regional scale deformation. The forces behind subduction zone earthquakes are of increasing environmental and societal importance.

Cenozoic Volcanism in the Mediterranean Area

Subduction Zone Magmatism

Earth Accretionary Systems in Space and Time

From Mantle Flow to Mega Disasters

New Zealand Journal of Geology and Geophysics

Papers Presented at the Tenth Pacific Science Congress of the Pacific Science Association, Held at the University of Hawaii, Honolulu, Hawaii, August 21 to September 6, 1961, and Sponsored by the National Academy of Sciences, the Bernice Pauahi Bishop Museum, and the University of Hawaii

The subduction interface is an inherently heterogeneous distributed shear zone occupying the boundary between a down-going (i.e., subducting) plate and overriding crust and mantle. The sinking of cold, dense oceanic lithosphere creates a slab pull force, which is a driving force for Plate Tectonics. Interface rheology (i.e., deformation or flow) exerts a first-order control on plate boundary strength, seismic style, and the propensity for rocks to exhume, or return to the surface of the Earth from mantle depths. When subducted rocks are exhumed, they provide rare snapshots of the rheological behavior of these complex plate boundary shear zones, and how rocks are subsequently modified by brittle and semi-brittle processes in the upper crust. In this dissertation, I combine a variety of observational and analytical techniques to investigate exhumed subduction-type rocks from Syros Island (Cyclades, Greece) and the sub-ophiolite metamorphic sole in Oman. This work provides constraints on the rheological behavior of subduction plate boundary shear zones, to better inform geodynamic models and to contextualize geophysical observations of active subduction zones. Rheological heterogeneities (i.e., outcrop- to regional-scale features producing strain gradients and/or significant differences in deformation mode or mechanism) are thought to be directly related to the seismic style that occurs along the subduction interface. At relevant depth and temperature conditions for Syros (~50-60 km, 500°C), the important seismic style is an enigmatic, coupled seismic-aseismic phenomena deemed Episodic Tremor and Slow Slip (ETS). ETS involves accelerated - but aseismic - slip over ~10's-100's km² of the interface, in conjunction with swarms of micro-seismicity, or tremor, and seems to occur nearly ubiquitously in subduction zones regardless of thermal structure, predicted depths of metamorphic dehydration reactions, or subducting rock type. In Chapter 2, I use exhumed blueschist- and greenschist-facies rocks on Syros to characterize the length scales, types, sources, and deformation mechanisms of rheological heterogeneities that occupy the deep subduction interface, and how they may contribute to enigmatic seismicity like ETS. Partial eclogitization of subducting rocks sets up stark rheological contrast across shear zones, which results in coupled brittle-viscous behavior assisted by near-lithostatic pore fluid pressures. Geologic observations are consistent with a mechanical model of ETS in which the deep interface comprises transiently brittle, potentially tremorgenic sub-patches, within a larger viscously creeping interface patch. These observations scale appropriately with geophysical constraints of tremor source areas and seismic moments. During a subduction-exhumation cycle, the length scales of mixing along the interface, maximum pressures (i.e., depths) that rocks reach, and mechanisms of rock exhumation depend in part on interface rheology.

In Chapters 3 and 4, I combine structural and microstructural analysis, novel techniques in thermobarometry, and new interpretation of published metamorphic geochronology on Syros to understand bulk interface deformational style, progressive metamorphism, and rheology. The results are all consistent with a model of coherent subduction and underplating (i.e., transfer of subducting material to the overriding forearc), as opposed to large-scale, chaotic mixing in a mega-mélange. Exhumation of rocks on Syros occurred nearly entirely by buoyancy- and viscosity-driven subduction channel return flow, which accommodated vertical translations of ~40 km from peak depths (60 km) to the middle-lower crust. These inferences are consistent with calculated estimates of shear zone viscosity, and the balance between buoyancy forces and shear tractions at peak subduction depths. While exhumation mechanisms and mechanical behavior of thermally mature subduction zones are particularly important to an understanding of subduction tectonics, subduction initiation is even more enigmatic and poorly understood. The only geologic record of rocks deformed and metamorphosed in infant subduction zones are present as tectonic slivers beneath the world's ophiolite sequences, deemed metamorphic soles. In Chapter 5, I investigate the structural and petrologic signatures of subduction, return flow, and ophiolite emplacement in a 100 m section of "low-temperature" metamorphic sole acquired during Phase I of the Oman Drilling Project (Site BT-1B). The "low-temperature" sole rocks acted as a mechanically coherent slice preserving various evidence for subduction and return flow prior to obduction. Intraoceanic subduction initiation is characterized by rapid cooling of the plate interface, which exerts primary control on metamorphic grade and changes in deformation mechanisms. Exhumation in the subduction channel accommodated at least 15 km of vertical translation, and occurred concurrently with early stages of ophiolite emplacement.

The Mediterranean is one of the most studied regions of the world. In spite of this, a considerable spread of opinions exists about the geodynamic evolution and the present tectonic setting of this zone. The difficulty in recognizing the driving mechanisms of deformation is due to a large extent to the complex distribution in space and time of tectonic events, to the high number of parameters involved in this problem and to the scarce possibility of carrying out quantitative estimates of the deformation implied by the various geodynamic hypotheses. However, we think that a great deal of the present ambiguity could be removed if there were more frequent and open discussions among the scientists who are working on this problem. The meeting of ERICE was organized to provide an opportunity in this sense. In making this effort, we were prompted by the conviction that each step towards the understanding of the Mediterranean evolution is of basic importance both for its scientific consequences and for the possible implications for society. It is well known, for instance, that the knowledge of ongoing tectonic processes in a given region and of their connection with seismic activity may lead to the recognition of middle long term precursors of

strong earthquakes. The few cases of tentative earthquake prediction in the world occurred where information on large scale seismotectonic behavior was available. This led to identify the zones prone to dangerous shocks, where observations of short-term earthquake precursors were then concentrated. The Mediterranean and northern Arabian regions provide a unique natural laboratory to constrain geodynamics associated with arc-continent and continent-continent collision and subsequent orogenic collapse by analysing regional and temporal distributions of the various elements in the geological archive. This book combines thirteen new contributions that highlight timing and distribution of the Cretaceous to Recent evolution of the Calabrian, Carpathian, Aegean and Anatolian segments of the Africa-Arabia-Eurasia subduction zone. These are subdivided into five papers documenting the timing and kinematics of Cretaceous arc-continent collision, and Eocene and Miocene continent-continent collision in Anatolia, with westward extrusion of Anatolia as a result. Eight papers provide an overview and new data from stratigraphy, structure, metamorphism and magmatism, covering the geological consequences of the largely Neogene collapse that characterizes the segments of interest, in response to late stage reorganization of the subduction zone, and the roll-back and break-off of (segments of) the subducting slab.

Tectonic and Magmatic Processes

25 Years After The Discovery Of Coesite And Diamond

Atlas of the Textural Patterns of Metamorphosed (transformed and Deformed) Rocks and Their Genetic Significance

A Celebration of the Career of Eldridge Moores

The Seismogenic Zone of Subduction Thrust Faults

A Geophysical, Geodynamical, and Geochemical Perspective

The Integrated Ocean Drilling Program (IODP: 2000-2013) has provided crucial records of past and present processes and interactions within and between the biosphere, cryosphere, atmosphere, hydrosphere and geosphere. Research in IODP encompasses a wide range of fundamental and applied issues that affect society, such as global climate change, biodiversity, the origin of life, natural hazards involving the study of earthquakes processes, and the internal structure and dynamics of our planet. This compilation of major findings from the 2003-2013/14 phase of IODP, focusing on scientific results rather than description of data acquisition and early inferences, provides invaluable information. Anyone wondering what scientific drilling can achieve will gain quick understanding of the range of questions that are uniquely addressed with this methodology and the ways these data dovetail with other regional information. The excitement of breakthrough findings that occasionally accompanies a drilling project will be evident. IODP obtained unique records from the global ocean basins during the 2003-2013 program phase. This book highlights findings in three theme areas: Subseafloor life and the marine biosphere; Earth's changing environments; and Dynamics of the solid Earth. Each core or borehole log provides a window revealing insights that no other data achieve. Presents syntheses of key results from the Integrated Ocean Drilling Program Encompasses a wide range of issues that affect

society Describes the Integrated Ocean Drilling Program and its expeditions. This volume highlights the career of Dr. Gaku Kimura, professor emeritus of geosciences at the University of Tokyo, by showing the spectrum of research required to understand these dynamic environments and the range of research he has inspired. The first three chapters provide context for the growth of accretionary prisms by examining the thermal structure of the ocean crust, and the sedimentary facies and potential fluid pathways in the Shikoku Basin. Next, two chapters look at the regional-scale structure of the plate boundary and the rheology and hysteresis of the hanging wall of the subduction zone in SW Japan. The following five chapters discuss the progressive deformation and thermal maturation of sediments along accretionary margins from Japan to New Zealand to western North America. The final two chapters look at the deformation processes near the subducting plate interface with the last chapter proposing a link between outcrop-scale observations and seismic slip. 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 subducted oceanic crust and overlying mantle wedge, which has subsequent implications regarding mass transport, fluid flow, and volatile storage in the lithospheric mantle overall, as well as both regional and localized crustal metamorphism. Metasomatic alteration of accessory minerals such as zircon or monazite can allow for the dating of metasomatic events as well as give additional information regarding the chemistry of the fluids responsible. Lastly present day movement of fluids in both the lithospheric mantle and deep to mid crust can be observed utilizing geophysical resources such as electrical resistivity and seismic data. Such observations help to further clarify the picture of actual metasomatic processes as inferred from basic petrographic, mineralogical, and geochemical data. The goal of this volume is to bring together a diverse group of geologists, each of whose specialities and long range experience regarding one or more aspects of metasomatism during geologic processes, should allow them to contribute to a series of review chapters, which outline the basis of our current understanding of how metasomatism influences and helps to control both the evolution and stability of the crust and lithospheric mantle.

Recent Evolution and Seismicity of the Mediterranean Region

GEOLOGY - Volume I

An Introduction

Superplumes: Beyond Plate Tectonics

Deep Carbon Science

Metasomatism and the Chemical Transformation of Rock

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.

This abundantly illustrated book provides a concise overview of our understanding of the entire mantle, its evolution since early differentiation and the consequences of superplumes for earth surface processes. The book's balanced authorship has

produced a state-of-the-science report on the emerging concept of superplumes. This presents a new concept to explain catastrophic events on Earth through geologic time. This book highlights and discusses recent developments that have contributed to an improved understanding of observed mantle heterogeneities and their relation to the thermo-chemical state of Earth's mantle, which ultimately holds the key to unlocking the secrets of the evolution of our planet. This series of topical reviews and original contributions address 4 themes. Theme 1 covers topics in geophysics, including global and regional seismic tomography, electrical conductivity and seismic imaging of mantle discontinuities and heterogeneities in the upper mantle, transition zone and lower mantle. Theme 2 addresses geochemical views of the mantle including lithospheric evolution from analysis of mantle xenoliths, composition of the deep Earth and the effect of water on subduction-zone processes. Theme 3 discusses geodynamical perspectives on the global thermo-chemical structure of the deep mantle. Theme 4 covers application of mineral physics data and phase equilibrium computations to infer the regional-scale thermo-chemical structure of the mantle.

Antarctic Research: the Matthew Fontaine Maury Memorial Symposium

Paleogeodynamics

Subduction Zones

A Modelling Study

Ophiolites, Arcs, and Batholiths

Collision and Collapse at the Africa-Arabia-Eurasia Subduction Zone /

This substantially revised edition includes recently published information relating to plate tectonics and continental origin. A large number of new figures have been added, and new sections included on meteorites, seismic tomography, mantle convection, accretionary terranes, mantle sources and evolution, continental growth, secular changes in Earth history, also a new chapter on exogenic Earth systems. In addition the following topics have been substantially revised: lunar origin, global gravity, origin of the core, metamorphism, plate boundaries, hotspots, tectonic settings, and magma associations. Among the new features the Tectonic Map of the World has also been updated.

Geology is the Component of Encyclopedia of Earth and Atmospheric Sciences, in the global Encyclopedia of Life Support Systems (EOLSS)), which is an integrated compendium of twenty Encyclopedias. The theme on geology in the Encyclopedia of Earth and Atmospheric Sciences, presents many aspects of geology under the following nine different topics: The Organized Earth.; Tectonics and Geodynamics; Igneous and Metamorphic Petrology; Sedimentary Geology and Paleontology; Overview of the Mineralogical Sciences; Geology of Metallic and Non-Metallic Mineral Resources; Regional Geology; Geology of Petroleum, Gas, and Coal; Environmental and Engineering Geology.

Evolution of Passive Continental Margins and Initiation of Subduction Zones