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### KEY=ANALYSIS - MATA HUDSON

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### UNCONVENTIONAL HYDROCARBON RESOURCES

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### TECHNIQUES FOR RESERVOIR ENGINEERING ANALYSIS

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John Wiley & Sons A comprehensive textbook presenting techniques for the analysis and characterization of shale plays Significant reserves of hydrocarbons cannot be extracted using conventional methods. Improvements in techniques such as horizontal drilling and hydraulic fracturing have increased access to unconventional hydrocarbon resources, ushering in the “shale boom” and disrupting the energy sector. Unconventional Hydrocarbon Resources: Techniques for Reservoir Engineering Analysis covers the geochemistry, petrophysics, geomechanics, and economics of unconventional shale oil plays. The text uses a step-by-step approach to demonstrate industry-standard workflows for calculating resource volume and optimizing the extraction process. Volume highlights include: Methods for rock and fluid characterization of unconventional shale plays A workflow for analyzing wells with stimulated reservoir volume regions An unconventional approach to understanding of fluid flow through porous media A comprehensive summary of discoveries of massive shale resources worldwide Data from Eagle Ford, Woodford, Wolfcamp, and The Bakken shale plays Examples, homework assignments, projects, and access to supplementary online resources Hands-on teaching materials for use in petroleum engineering software applications The American Geophysical Union promotes discovery in Earth and space science for the benefit of humanity. Its publications disseminate scientific knowledge and provide resources for researchers, students, and professionals.

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### COOPER BASIN PETROLEUM SYSTEMS ANALYSIS

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### REGIONAL HYDROCARBON PROSPECTIVITY OF THE COOPER BASIN

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“Cooper Basin is an upper Carboniferous-Middle Triassic intracratonic basin in northeastern South Australia and southwestern Queensland. The basin is Australia's premier onshore hydrocarbon producing province and also hosts a range of unconventional gas play types within the Permian Gidgealpa Group, including basin-centred gas and tight gas accumulations, deep dry coal gas associated with the Patchawarra and Toolachee formations, the Murteree and Roseneath shale gas plays and deep coal seam gas in the Weena Trough (e.g. Goldstein et al., 2012). The principal source rocks for these plays are the Permian coals and coaly shales of the Gidgealpa Group (Boreham & Hill, 1998; Deighton et al., 2003; Carr et al., 2016). Mapping the petroleum generation potential of these source rocks, together with describing the resulting fluid composition, is critical for understanding the hydrocarbon prospectivity of the basin. This study applies petroleum systems analysis to investigate the maturity and generation potential of the Cooper Basin source rocks and is underpinned by a public domain, pseudo-3D petroleum systems model (Hall & Palu, 2016).”--Online abstract.

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### EVALUATING PETROLEUM SYSTEMS USING ADVANCED GEOCHEMISTRY AND BASIN MODELING

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In the past decade, three-dimensional (3-D) basin and petroleum system modeling of the subsurface through geological time has evolved as a major research focus of both the petroleum industry and academia. The major oil companies have independently recognized the need for basin and petroleum system modeling to archive data, facilitate visualization of risk, convert static data into dynamic processed data, and provide an approach to evaluate potential prospects in oil and gas exploration. Basin and petroleum system modeling gives geoscientists the opportunity to examine the dynamics of sedimentary basins and their associated fluids to determine if past conditions were suitable for hydrocarbons to fill potential reservoirs and be preserved there. The success of any exploration campaign requires basin and petroleum system modeling as a methodology to predict the likelihood of success given available data and associated uncertainties. It is not guaranteed that hydrocarbons will be found by drilling a closed subsurface structure. Early petroleum system studies began more than 50 years ago. Geoscientists seek to describe how basins form, fill and deform, focusing mainly on compacting sediments and the resulting rock structures. Since then, tremendous efforts have been concentrated on developing methods to model these geological processes quantitatively. Studies such as applying mathematical algorithms to seismic, stratigraphic, palentologic, petrophysical data, and well logs were employed to reconstruct the evolution of sedimentary basins. In the early 1970s, geochemists developed methods to predict the petroleum generation potentials of source rocks in quantitative terms. After that, they began to use sedimentary basin models as geological frameworks for correlations between hydrocarbons and their potential source rocks. Since then, many concepts have been widely used in the petroleum industry, such as oil system, hydrocarbon system, hydrocarbon machine, and petroleum system. The term "petroleum system" is now commonly used in the industry. A petroleum system comprises a pod of active source rock and the oil and gas derived from it as established by geochemical correlation. The concept embodies all of the geologic elements and processes needed for oil and gas to accumulate. The essential elements include effective source rock, reservoir, seal and overburden rock. The processes include trap formation and the generation, migration and accumulation of petroleum. These elements and processes must occur in a proper order for the organic matter in a source rock to be converted into petroleum and then preserved. Absence of any of those elements can cause a dry prospect. In this dissertation, we use "basin and petroleum system modeling" (BPSM) as a method to track the evolution of a basin through geological time as it fills with sediments that could generate or contain hydrocarbons. We could also use it to evaluate and predict undiscovered conventional and unconventional hydrocarbon resources and to further understand the controls on petroleum generation, migration, accumulation. In deterministic forward modeling, basin and petroleum system processes are modeled from past to present using inferred starting conditions. Basin and petroleum system modeling is analogous to a reservoir simulation, but BPSM represents dynamic simulation through geological time. All of the dynamic processes in the basin and petroleum system modeling can be examined at several levels, and complexity typically increases with spatial dimensionality. The simplest is 1D modeling which examines burial history at a point location in a pseudowell. Two-dimensional modeling can be used to reconstruct oil and gas generation, migration and accumulation along a cross section. Three-dimensional modeling reconstructs petroleum systems at reservoir and basin scales and has the ability to display the output in 1D, 2D or 3D and through time. In general, which modeling approach is chosen depends on the purpose of the study and the types of problems to be resolved. Basin and petroleum system modeling continues to grow in importance as a tool to understand subsurface geology and basin evolution by integrating key aspects from geochemistry, geology, geophysics and stratigraphy. Among the above key aspects, geochemistry is the most important tool to understand the processes affecting petroleum systems. Better understanding of petroleum systems improves exploration efficiency. The first step in identifying petroleum systems is to characterize and map the geographic distribution of oil and gas types. Geochemical tools such as biomarkers, diamondoids and carbon isotope analysis are used to conduct oil-oil and oil-source correlation, which is key to understand and determine the geographic extent of petroleum systems in the basin. Chapter 1 offers a good example of how basin and petroleum system modeling and geochemistry improve understanding of active petroleum systems in the San Joaquin Basin, California. The modeling results indicate that there could be a deep, previously unrecognized source rock in the study area. Chapter 2 is a detailed unconventional geochemical analysis (i.e., diamondoid analysis, compound-specific isotopes of biomarkers and diamondoids) on petroleum systems in Arctic (Barents Sea and northern Timan Pechora Basin) to investigate deep sources in that area. Cutting-edge geochemical analyses were conducted in this project to identify the oil-oil and oil-source relationships and further understand reservoir filling histories and migration pathways. Since the deep source is at a great depth, thermal cracking always occurred in the source or the deeply buried reservoir, thus generating light hydrocarbons and gas. In addition, we hope to better understand the geochemical characteristics of worldwide Phanerozoic source rocks (Paleozoic source rock in Barents Sea-Timan Pechora area, Mesozoic and Cenozoic source rocks in the Vallecitos syncline in San Joaquin Basin). These results could also provide valuable input data for building basin and petroleum system models in the Arctic area once more data become available. Chapter 1 is a study of using basin modeling and geochemical analysis to evaluate the active source rocks in the Vallecitos syncline, San Joaquin Basin, and improve our understanding of burial history and the timing of hydrocarbon generation. Our earlier 1D modeling indicated that there could be two active source rocks in the syncline: Eocene Kreyenhagen and Cretaceous Moreno formations. The results differ from earlier interpretations that the Kreyenhagen Formation was the only source rock in the Vallecitos syncline, and suggest that the bottom of the Cretaceous Moreno Formation in the syncline reached thermal maturity as early as 42 Ma. The synclinal Eocene Kreyenhagen Formation became thermally mature as early as 19 Ma. Thick (~2 km) overburden rock in the central part of the syncline with additional heating from a thermal anomaly pushed the shallow Eocene

Kreyenhagen source rock into the oil window in very recent times. In contrast, the Cretaceous Moreno source rock reached extremely high maturity (past the dry gas window). The 2D model results indicate that the bottom part of the Kreyenhagen Formation is in the mature stage of hydrocarbon generation and that the formation remains immature on the flanks of the present-day syncline. In contrast, the bottom part of the Moreno Formation achieved the gas generation zone and is in the oil generation zone on the flanks of the syncline. Biomarker analysis was conducted on 22 oil samples from the syncline. Source-related biomarkers show two genetic groups, which originated from two different source rocks. The 2D model results are supported by biomarker geochemistry and are also consistent with our earlier 1D burial history model in the Vallecitos syncline. In addition, we identified two potential petroleum systems in the Vallecitos syncline. The basin models for this study were conducted by me and Stephan Graham, Allegra Hosford Scheirer, Carolyn Lampe, Leslie Magoon. The detailed geological data was provided by Stephan Graham. The modeling related references and fundamental data were provided by Allegra Hosford Scheirer, but I conducted the modeling. The geochemical laboratory work and data analysis has been completed by me and supervised by Mike Moldowan and Kenneth Peters. The funding for this project was contributed by Basin and Petroleum System Modeling (BPSM) and molecular organic geochemistry industrial affiliates (MOGIA) programs. This chapter was submitted to Marine and Petroleum Geology with co-authors Stephan Graham, Allegra Hosford Scheirer and Kenneth Peters. All co-authors contributed important ideas, discussion, and guidance. Chapter 2 documents the existing deep source in the Barents Sea and northern Timan-Pechora Basin. Total thirty-four oil samples were analyzed to understand the types and distributions of effective source rocks and evaluate the geographic extent of the petroleum systems in the study area. Taxon-specific, age-related and source-related biomarkers and isotope data provided information on the depositional environment of the source rock, source input, and source age of the oil samples. A relationship between biomarker and diamondoid concentration was used to identify mixed oils having both oil-window and highly cracked components. Compound-specific isotope analyses of diamondoids and n-alkanes were used to deconvolute co-sourced oils and identify deep source rocks in the basin. The results suggest five major source rocks in the Barents Sea and the northern Timan-Pechora Basin: Upper Jurassic shale, Lower-Middle Jurassic shale, Triassic carbonate/shale, Devonian marl and Devonian carbonate. The Upper and Lower-Middle Jurassic source rocks are dominant in the Barents Sea. Triassic source rock consists of carbonate in the ons ...

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## UNCONVENTIONAL PETROLEUM GEOLOGY

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Newnes Unconventional Petroleum Geology is the first book of its kind to collectively identify, catalog, and assess the exploration and recovery potential of the Earth's unconventional hydrocarbons. Advances in hydrocarbon technology and petroleum development systems have recently made the exploration of unconventional hydrocarbons—such as shale gas, tight sandstone oil and gas, heavy oil, tar sand, and coalbed methane—the hottest trend in the petroleum industry. Detailed case studies act as real-world application templates, making the book's concepts immediately practical and useful by exploration geologists. The logical and intuitive three-part approach of systematically identifying an unconventional hydrocarbon, cataloging its accumulation features, and assessing its exploration and recovery potential can be immediately implemented in the field—anywhere in the world. Provides a detailed assessment of the exploration and recovery potential of the full range of unconventional hydrocarbons More than 300 illustrations—many in full color—capture the detailed intricacies and associated technological advances in unconventional hydrocarbon exploration More than 20 case studies and examples from around the world conclude each chapter and aid in the application of key exploration and recovery techniques

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## UNCONVENTIONAL RESERVOIRS: RATE AND PRESSURE TRANSIENT ANALYSIS TECHNIQUES

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### A RESERVOIR ENGINEERING APPROACH

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Springer Nature This book provides a succinct overview on the application of rate and pressure transient analysis in unconventional petroleum reservoirs. It begins by introducing unconventional reservoirs, including production challenges, and continues to explore the potential benefits of rate and pressure analysis methods. Rate transient analysis (RTA) and pressure transient analysis (PTA) are techniques for evaluating petroleum reservoir properties such as permeability, original hydrocarbon in-place, and hydrocarbon recovery using dynamic data. The brief introduces, describes and classifies both techniques, focusing on the application to shale and tight reservoirs. Authors have used illustrations, schematic views, and mathematical formulations and code programs to clearly explain application of RTA and PTA in complex petroleum systems. This brief is of an interest to academics, reservoir engineers and graduate students.

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## UNCONVENTIONAL PETROLEUM GEOLOGY

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Elsevier Unconventional Petroleum Geology, Second Edition presents the latest research results of global conventional and unconventional petroleum exploration and production. The first part covers the basics of unconventional petroleum geology, its introduction, concept of unconventional petroleum geology, unconventional oil and gas reservoirs, and the origin and distribution of unconventional oil and gas. The second part is focused on unconventional petroleum development technologies, including a series of technologies on resource assessment, lab analysis, geophysical interpretation, and drilling and completion. The third and final section features case studies of unconventional hydrocarbon resources, including tight oil and gas, shale oil and gas, coal bed methane, heavy oil, gas hydrates, and oil and gas in volcanic and metamorphic rocks. Provides an up-to-date, systematic, and comprehensive overview of all unconventional hydrocarbons Reorganizes and updates more than half of the first edition content, including four new chapters Includes a glossary on unconventional petroleum types, including tight-sandstone oil and gas, coal-bed gas, shale gas, oil and gas in fissure-cave-type carbonate rocks, in volcanic reservoirs, and in metamorphic rocks, heavy crude oil and natural bitumen, and gas hydrates Presents new theories, new methods, new technologies, and new management methods, helping to meet the demands of technology development and production requirements in unconventional plays

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## REGIONAL GEOLOGY AND TECTONICS: PRINCIPLES OF GEOLOGIC ANALYSIS

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### VOLUME 1: PRINCIPLES OF GEOLOGIC ANALYSIS

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

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## THE ROLE OF ORGANIC PETROLOGY IN THE EXPLORATION OF CONVENTIONAL AND UNCONVENTIONAL HYDROCARBON SYSTEMS

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Bentham Science Publishers Organic petrology is a discipline of geology which integrates multidisciplinary approaches for the exploration and evaluation of fossil fuel resources by conventional and unconventional procedures. Organic petrology has brought forth new, powerful analytical tools for the characterization of geological hydrocarbon systems, thus providing information where previous analytical techniques prove to be less effective. The reference provides a broad, comprehensive source of information about the application of organic petrology in the investigation of geological formations related with the production and accumulation of oil and gas. Eleven chapters cover a variety of topics (kerogens, dispersed organic matter systems, sedimentary organic matter systems, oil and gas shales, etc.). Additional information in chapters referring to examples in specific geographical locations provides a global perspective of hydrocarbon exploration. The book is an introductory reference for all scholars involved in applied organic petrology of hydrocarbon systems including graduate and undergraduate geology students, engineers and lab technicians. [Series intro] Geology: Current and Future Developments is a book series that brings together the latest contributions to geological research. Each volume features chapters contributed by academic scholars / professional experts from around the world. The scope of the book series includes (but is not limited to) topics such as plate tectonics, climate science, hydrocarbon exploration, mineral exploration, and environmental science. This series is intended as a useful compendium of scholarly reference material for geology students and professionals.

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## UNCONVENTIONAL OIL AND GAS RESOURCES HANDBOOK

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### EVALUATION AND DEVELOPMENT

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Gulf Professional Publishing Unconventional Oil and Gas Resources Handbook: Evaluation and Development is a must-have, helpful handbook that brings a wealth of information to engineers and geoscientists. Bridging between subsurface and production, the handbook

provides engineers and geoscientists with effective methodology to better define resources and reservoirs. Better reservoir knowledge and innovative technologies are making unconventional resources economically possible, and multidisciplinary approaches in evaluating these resources are critical to successful development. Unconventional Oil and Gas Resources Handbook takes this approach, covering a wide range of topics for developing these resources including exploration, evaluation, drilling, completion, and production. Topics include theory, methodology, and case histories and will help to improve the understanding, integrated evaluation, and effective development of unconventional resources. Presents methods for a full development cycle of unconventional resources, from exploration through production Explores multidisciplinary integrations for evaluation and development of unconventional resources and covers a broad range of reservoir characterization methods and development scenarios Delivers balanced information with multiple contributors from both academia and industry Provides case histories involving geological analysis, geomechanical analysis, reservoir modeling, hydraulic fracturing treatment, microseismic monitoring, well performance and refracturing for development of unconventional reservoirs

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**STRUCTURE AND DIAGENESIS IN UPPER CARBONIFEROUS TIGHT GAS RESERVOIRS IN NW GERMANY**

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KIT Scientific Publishing

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**UNCONVENTIONAL GAS RESERVOIRS**

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**EVALUATION, APPRAISAL, AND DEVELOPMENT**

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Elsevier Natural gas, especially unconventional gas, has an increasingly important role in meeting the world's energy needs. Experts estimate that it has the potential to add anywhere from 60-250% to the global proven gas reserve in the next two decades. To maintain pace with increasing global demand, Unconventional Gas Reservoirs provides the necessary bridge into the newer processes, approaches and designs to help identify these more uncommon reservoirs available and how to maximize its unconventional potential. Loaded with reservoir development and characterization strategies, this book will show you how to: Recognize the challenges and opportunities surrounding unconventional gas reservoirs Distinguish among the various types of unconventional reservoirs, such as shale gas, coalbed methane, and tight gas formations Drill down and quantify the reservoir's economic potential and other critical considerations Gain practical insights and tools to efficiently identify, appraise, and develop unconventional gas reservoirs Understand various techniques used to analyze reservoir parameters and performance as well as how they were applied to numerous real-world case studies Upgrade to the latest information on perspectives and insights with discussion of key differences used for today's unconventional gas characterization versus original conventional methods that failed in the past

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**CHARACTERIZATION OF AN UPPER PERMIAN TIGHT GAS RESERVOIR**

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**A MULTIDISCIPLINARY, MULTISCALE ANALYSIS FROM THE ROTLIEGEND, NORTHERN GERMANY**

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Springer Science & Business Media "The thesis of Philipp Antrett is focused on reservoir properties, petrography, lithofacies and sedimentology, core analysis and nanoporosity studies. It will be of major interest for colleagues involved in the exploration and production of tight gas reservoirs in Northern Europe and elsewhere." - François Roure, August 2012 This thesis describes a multidisciplinary, multiscale approach to the analysis of tight gas reservoirs. It focused initially on the facies architecture of a Permian tight gas field in the Southern Permian Basin (SPB), East Frisia, northern Germany. To improve field development, 3D seismic data, wireline and core data were compared to a reservoir analogue in the Panamint Valley, California, United States. In addition to the large scale approach, a work flow that investigates microporosity by combining Scanning Electron Microscopy-Broad Ion Beam (SEM-BIB) and optical microscopy was developed. For a better understanding of the depositional environment and reservoir rock distribution in the SPB, a sedimentary facies analysis of four cores from the tight gas field in East Frisia was compared to a second study area in northern central Germany. This study demonstrates that tight gas exploration and production requires multidisciplinary, multiscale approaches beyond standard seismic interpretation work flows to better understand the temporal and spatial evolution of these complex reservoirs.

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**THE PETROLEUM SYSTEM**

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**STATUS OF RESEARCH AND METHODS, 1990**

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Investigations about porosity in petroleum reservoir rocks are discussed by Schmoker and Gautier. Pollastro discusses the uses of clay minerals as exploration tools that help to elucidate basin, source-rock, and reservoir history. The status of fission-track analysis, which is useful for determining the thermal and depositional history of deeply buried sedimentary rocks, is outlined by Naeser. The various ways workers have attempted to determine accurate ancient and present-day subsurface temperatures are summarized with numerous references by Barker. Clayton covers three topics: (1) the role of kinetic modeling in petroleum exploration, (2) biological markers as an indicator of depositional environment of source rocks and composition of crude oils, and (3) geochemistry of sulfur in source rocks and petroleum. Anders and Hite evaluate the current status of evaporite deposits as a source for crude oil.

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**FLOW AND TRANSPORT PROPERTIES OF UNCONVENTIONAL RESERVOIRS 2018**

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MDPI Unconventional reservoirs are usually complex and highly heterogeneous, such as shale, coal, and tight sandstone reservoirs. The strong physical and chemical interactions between fluids and pore surfaces lead to the inapplicability of conventional approaches for characterizing fluid flow in these low-porosity and ultralow-permeability reservoir systems. Therefore, new theories and techniques are urgently needed to characterize petrophysical properties, fluid transport, and their relationships at multiple scales for improving production efficiency from unconventional reservoirs. This book presents fundamental innovations gathered from 21 recent works on novel applications of new techniques and theories in unconventional reservoirs, covering the fields of petrophysical characterization, hydraulic fracturing, fluid transport physics, enhanced oil recovery, and geothermal energy. Clearly, the research covered in this book is helpful to understand and master the latest techniques and theories for unconventional reservoirs, which have important practical significance for the economic and effective development of unconventional oil and gas resources.

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**APPLICATION OF ANALYTICAL TECHNIQUES TO PETROLEUM SYSTEMS**

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Geological Society of London Cutting-edge techniques have always been utilized in petroleum exploration and production to reduce costs and improve efficiencies. The demand for petroleum in the form of oil and gas is expected to increase for electricity production, transport and chemical production, largely driven by an increase in energy consumption in the developing world. Innovations in analytical methods will continue to play a key role in the industry moving forwards as society shifts towards lower carbon energy systems and more advantaged oil and gas resources are targeted. This volume brings together new analytical approaches and describes how they can be applied to the study of petroleum systems. The papers within this volume cover a wide range of topics and case studies, in the fields of fluid and isotope geochemistry, organic geochemistry, imaging and sediment provenance. The work illustrates how the current, state-of-the-art technology can be effectively utilised to address ongoing challenges in petroleum geoscience.

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**ADVANCES IN GEOLOGY OF UNCONVENTIONAL HYDROCARBON RESOURCES**

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Frontiers Media SA

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**ADVANCES IN THE EXPLORATION AND DEVELOPMENT OF UNCONVENTIONAL OIL AND GAS: FROM THE INTEGRATION OF GEOLOGY AND ENGINEERING**

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Frontiers Media SA

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## UNCONVENTIONAL OIL AND GAS RESOURCES

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### EXPLOITATION AND DEVELOPMENT

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CRC Press As the shale revolution continues in North America, unconventional resource markets are emerging on every continent. In the next eight to ten years, more than 100,000 wells and one- to two-million hydraulic fracturing stages could be executed, resulting in close to one trillion dollars in industry spending. This growth has prompted professionals experienced in conventional oil and gas exploitation and development to acquire practical knowledge of the unconventional realm. **Unconventional Oil and Gas Resources: Exploitation and Development** provides a comprehensive understanding of the latest advances in the exploitation and development of unconventional resources. With an emphasis on shale, this book: Addresses all aspects of the exploitation and development process, from data mining and accounting to drilling, completion, stimulation, production, and environmental issues Offers in-depth coverage of sub-surface measurements (geological, geophysical, petrophysical, geochemical, and geomechanical) and their interpretation Discusses the use of microseismic, fiber optic, and tracer reservoir monitoring technologies and JewelSuite™ reservoir modeling software Presents the viewpoints of internationally respected experts and researchers from leading exploration and production (E&P) companies and academic institutions Explores future trends in reservoir technologies for unconventional resources development **Unconventional Oil and Gas Resources: Exploitation and Development** aids geologists, geophysicists, petrophysicists, geomechanic specialists, and drilling, completion, stimulation, production, and reservoir engineers in the environmentally safe exploitation and development of unconventional resources like shale.

### ENHANCED OIL RECOVERY PROCESSES

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#### NEW TECHNOLOGIES

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BoD - Books on Demand Concerned with production decline, shortages of new oil reserves, and increasing world energy demand, the oil sector continues to search for economic and efficient techniques to enhance their oil recovery from the existing oil field using several enhanced oil recovery techniques (EOR) methods. Despite its high efficiency, widely acclaimed potentials, and limitations, the Low Salinity Water Flooding (LSWF), hybrid, and nanotechnology applications have gained vast interest with promising future to increase ultimate oil recovery, tackle operational challenges, reduce environmental damage, and allow the highest feasible recoveries with lower production costs. This synergistic combination has opened new routes for novel materials with fascinating properties. This book aims to provide an overview of EOR technology such as LSWF, hybrid, and nanotechnology applications in EOR processes.

### SPRINGER HANDBOOK OF PETROLEUM TECHNOLOGY

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Springer This handbook provides a comprehensive but concise reference resource for the vast field of petroleum technology. Built on the successful book "Practical Advances in Petroleum Processing" published in 2006, it has been extensively revised and expanded to include upstream technologies. The book is divided into four parts: The first part on petroleum characterization offers an in-depth review of the chemical composition and physical properties of petroleum, which determine the possible uses and the quality of the products. The second part provides a brief overview of petroleum geology and upstream practices. The third part exhaustively discusses established and emerging refining technologies from a practical perspective, while the final part describes the production of various refining products, including fuels and lubricants, as well as petrochemicals, such as olefins and polymers. It also covers process automation and real-time refinery-wide process optimization. Two key chapters provide an integrated view of petroleum technology, including environmental and safety issues. Written by international experts from academia, industry and research institutions, including integrated oil companies, catalyst suppliers, licensors, and consultants, it is an invaluable resource for researchers and graduate students as well as practitioners and professionals.

### PRACTICAL PETROLEUM GEOCHEMISTRY FOR EXPLORATION AND PRODUCTION

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Elsevier Practical Petroleum Geochemistry for Exploration and Production, Second Edition provides readers with a single reference that addresses the principle concepts and applications of petroleum geochemistry used in finding, evaluating, and producing petroleum deposits. The revised volume includes a new chapter on environmental forensic applications of petroleum geochemistry. With the current emphasis on environmental issues (pollution, climate changes, and corporate responsibility), information about how petroleum geochemistry can be used to recognize these problems, determine their source, help identify who is responsible, and how these problems may be mitigated are vital to efficient and economical operation of a project from exploration to production to abandonment. Practical Petroleum Geochemistry for Exploration and Production, Second Edition will continue to serve as a foundational reference to understanding the underpinning of the science, as well as a source of references that the reader can use to find detailed descriptions of methods and protocols. Emphasizes the practical application of geochemistry in solving exploration and production problems Features more than 200 illustrations, tables, diagrams, and case studies to underscore key concepts Authored by an expert geochemist with over 40 years of experience in field-based research, applications, and instruction New edition includes a chapter on environmental issues (impact, climate change, pollution, and corporate responsibility), as well as expanded coverage of topics such as hydrates as unconventional resources; geomicrobial methods (especially DNA analysis) and the use of sea surface slicks from seafloor seeps in surface geochemistry; using GC x GC and asphaltene FTIR in oil correlation studies; and interpretation isotope data for the maturity of thermogenic natural gas

### ENERGY ABSTRACTS FOR POLICY ANALYSIS

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#### MESOZOIC RESOURCE POTENTIAL IN THE SOUTHERN PERMIAN BASIN

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Geological Society of London The Southern Permian Basin, as its name suggests, is a historical heartland for hydrocarbon production from the Palaeozoic Rotliegend interval. However, in this mature basin the Mesozoic presents further possibilities to offer resource security to NW Europe. Such opportunities include increasing efficiency in the production of discovered hydrocarbons, exploration for further hydrocarbons (both conventional and unconventional) and efficient exploration for, and production of, geothermal energy. All these potential resources require a grounding in technically sound geoscience, via traditional scientific observation and the application of new technologies, to unlock their value. The main aim of this volume is to bring together the work of academics and industry workers to consider cross-border geoscience including contributions on Poland, Germany, The Netherlands, the United Kingdom and adjacent areas. The work presented intends to contribute to the development and discovery of further Mesozoic energy resources across the basin.

#### MACHINE LEARNING FOR SUBSURFACE CHARACTERIZATION

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Gulf Professional Publishing Machine Learning for Subsurface Characterization develops and applies neural networks, random forests, deep learning, unsupervised learning, Bayesian frameworks, and clustering methods for subsurface characterization. Machine learning (ML) focusses on developing computational methods/algorithms that learn to recognize patterns and quantify functional relationships by processing large data sets, also referred to as the "big data." Deep learning (DL) is a subset of machine learning that processes "big data" to construct numerous layers of abstraction to accomplish the learning task. DL methods do not require the manual step of extracting/engineering features; however, it requires us to provide large amounts of data along with high-performance computing to obtain reliable results in a timely manner. This reference helps the engineers, geophysicists, and geoscientists get familiar with data science and analytics terminology relevant to subsurface characterization and demonstrates the use of data-driven methods for outlier detection, geomechanical/electromagnetic characterization, image analysis, fluid saturation estimation, and pore-scale characterization in the subsurface. Learn from 13 practical case studies using field, laboratory, and simulation data Become knowledgeable with data science and analytics terminology relevant to subsurface characterization Learn frameworks, concepts, and methods important for the engineer's and geoscientist's toolbox needed to support

#### UNCONVENTIONAL RESERVOIR RATE-TRANSIENT ANALYSIS

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Gulf Professional Publishing **Unconventional Reservoir Rate-Transient Analysis** provides petroleum engineers and geoscientists with the first comprehensive review of rate-transient analysis (RTA) methods as applied to unconventional reservoirs. **Volume One—Fundamentals, Analysis Methods, and Workflow** is comprised of five chapters which address key concepts and analysis methods used in RTA. This volume overviews the fundamentals of RTA, as applied to low-permeability oil and gas reservoirs exhibiting simple

reservoir and fluid characteristics. Volume Two—Application to Complex Reservoirs, Exploration and Development is comprised of four chapters that demonstrate how RTA can be applied to coalbed methane reservoirs, shale gas reservoirs, and low-permeability/shale reservoirs exhibiting complex behavior such as multiphase flow. Use of RTA to assist exploration and development programs in unconventional reservoirs is also demonstrated. This book will serve as a critical guide for students, academics, and industry professionals interested in applying RTA methods to unconventional reservoirs. Gain a comprehensive review of key concepts and analysis methods used in modern rate-transient analysis (RTA) as applied to low-permeability ("tight") oil and gas reservoirs Improve your RTA methods by providing reservoir/hydraulic fracture properties and hydrocarbon-in-place estimates for unconventional gas and light oil reservoirs exhibiting complex reservoir behaviors Understand the provision of a workflow for confident application of RTA to unconventional reservoirs

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### REGIONAL GEOLOGY AND TECTONICS: PRINCIPLES OF GEOLOGIC ANALYSIS

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Elsevier Expert petroleum geologists David Roberts and Albert Bally bring you Regional Geology and Tectonics: Principles of Geologic Analysis, volume one in a three-volume series covering Phanerozoic regional geology and tectonics. It has been written to provide you with a detailed overview of geologic rift systems, passive margins, and cratonic basins, it features the basic principles necessary to grasping the conceptual approaches to hydrocarbon exploration in a broad range of geological settings globally. Named a 2013 Outstanding Academic Title by the American Library Association's Choice publication A "how-to" regional geology primer that provides a detailed overview of tectonics, rift systems, passive margins, and cratonic basins The principles of regional geological analysis and the main geological and geophysical tools are discussed in detail. The tectonics of the world are captured and identified in detail through a series of unique geographic maps, allowing quick access to exact tectonic locations. Serves as the ideal introductory overview and complementary reference to the core concepts of regional geology and tectonics offered in volumes two and three in the series.

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### SHALE RESERVOIRS

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#### GIANT RESOURCES FOR THE 21ST CENTURY, AAPG MEMOIR 97

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AAPG Hardcover plus CD

#### HEAVY-OIL AND OIL-SAND PETROLEUM SYSTEMS IN ALBERTA AND BEYOND

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#### AAPG STUDIES IN GEOLOGY 64

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AAPG Hardcover plus CD

### BASIN ANALYSIS

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#### PRINCIPLES AND APPLICATION TO PETROLEUM PLAY ASSESSMENT

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John Wiley & Sons Basin Analysis is an advanced undergraduate and postgraduate text aimed at understanding sedimentary basins as geodynamic entities. The rationale of the book is that knowledge of the basic principles of the thermo-mechanical behaviour of the lithosphere, the dynamics of the mantle, and the functioning of sediment routing systems provides a sound background for studying sedimentary basins, and is a pre-requisite for the exploitation of resources contained in their sedimentary rocks. The third edition incorporates new developments in the burgeoning field of basin analysis while retaining the successful structure and overall philosophy of the first two editions. The text is divided into 4 parts that establish the geodynamical environment for sedimentary basins and the physical state of the lithosphere, followed by a coverage of the mechanics of basin formation, an integrated analysis of the controls on the basin-fill and its burial and thermal history, and concludes with an application of basin analysis principles in petroleum play assessment, including a discussion of unconventional hydrocarbon plays. The text is richly supplemented by Appendices providing mathematical derivations of a wide range of processes affecting the formation of basins and their sedimentary fills. Many of these Appendices include practical exercises that give the reader hands-on experience of quantitative solutions to important basin analysis processes. Now in full colour and a larger format, this third edition is a comprehensive update and expansion of the previous editions, and represents a rigorous yet accessible guide to problem solving in this most integrative of geoscientific disciplines. Additional resources for this book can be found at: <http://www.wiley.com/go/allen/basinanalysis>

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### UNCONVENTIONAL RESERVOIR GEOMECHANICS

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Cambridge University Press A comprehensive overview of the key geologic, geomechanical and engineering principles that govern the development of unconventional oil and gas reservoirs. Covering hydrocarbon-bearing formations, horizontal drilling, reservoir seismology and environmental impacts, this is an invaluable resource for geologists, geophysicists and reservoir engineers.

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### SHALE

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#### SUBSURFACE SCIENCE AND ENGINEERING

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John Wiley & Sons Advances in theories, methods and applications for shale resource use Shale is the dominant rock in the sedimentary record. It is also the subject of increased interest because of the growing contribution of shale oil and gas to energy supplies, as well as the potential use of shale formations for carbon dioxide sequestration and nuclear waste storage. Shale: Subsurface Science and Engineering brings together geoscience and engineering to present the latest models, methods and applications for understanding and exploiting shale formations. Volume highlights include: Review of current knowledge on shale geology Latest shale engineering methods such as horizontal drilling Reservoir management practices for optimized oil and gas field development Examples of economically and environmentally viable methods of hydrocarbon extraction from shale Discussion of issues relating to hydraulic fracturing, carbon sequestration, and nuclear waste storage Book Review: I. D. Sasowsky, University of Akron, Ohio, September 2020 issue of CHOICE, CHOICE connect, A publication of the Association of College and Research Libraries, A division of the American Library Association, Connecticut, USA Shale has a long history of use as construction fill and a ceramic precursor. In recent years, its potential as a petroleum reservoir has generated renewed interest and intense scientific investigation. Such work has been significantly aided by the development of instrumentation capable of examining and imaging these very fine-grained materials. This timely multi-author volume brings together 15 studies covering many facets of the related science. The book is presented in two sections: an overview and a second section emphasizing unconventional oil and gas. Topics covered include shale chemistry, metals content, rock mechanics, borehole stability, modeling, and fluid flow, to name only a few. The introductory chapter (24 pages) is useful and extensively referenced. The lead chapter to the second half of the book, "Characterization of Unconventional Resource Shales," provides a notably detailed analysis supporting a comprehensive production workflow. The book is richly illustrated in full color, featuring high-quality images, graphs, and charts. The extensive index provides depth of access to the volume. This work will be of special interest to a diverse group of investigators moving forward with understanding this fascinating group of rocks. Summing Up: Recommended. Upper-division undergraduates through faculty and professionals.

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### UNCONVENTIONAL HYDROCARBON RESOURCES

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#### TECHNIQUES FOR RESERVOIR ENGINEERING ANALYSIS

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John Wiley & Sons A comprehensive textbook presenting techniques for the analysis and characterization of shale plays Significant reserves of hydrocarbons cannot be extracted using conventional methods. Improvements in techniques such as horizontal drilling and hydraulic fracturing have increased access to unconventional hydrocarbon resources, ushering in the "shale boom" and disrupting the energy sector. Unconventional Hydrocarbon Resources: Techniques for Reservoir Engineering Analysis covers the geochemistry,

petrophysics, geomechanics, and economics of unconventional shale oil plays. The text uses a step-by-step approach to demonstrate industry-standard workflows for calculating resource volume and optimizing the extraction process. Volume highlights include: Methods for rock and fluid characterization of unconventional shale plays A workflow for analyzing wells with stimulated reservoir volume regions An unconventional approach to understanding of fluid flow through porous media A comprehensive summary of discoveries of massive shale resources worldwide Data from Eagle Ford, Woodford, Wolfcamp, and The Bakken shale plays Examples, homework assignments, projects, and access to supplementary online resources Hands-on teaching materials for use in petroleum engineering software applications The American Geophysical Union promotes discovery in Earth and space science for the benefit of humanity. Its publications disseminate scientific knowledge and provide resources for researchers, students, and professionals.

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#### **PETROGRAPHIC AND MICROFACIES ANALYSIS OF THE SHUBLIK FORMATION, NORTHERN ALASKA**

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#### **IMPLICATIONS FOR AN UNCONVENTIONAL RESOURCE SYSTEM**

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The North Slope of Alaska includes a world-class conventional petroleum system that has been producing for approximately 40 years. While the regional stratigraphy includes multiple proven source and reservoir rocks, the Middle to Upper Triassic Shublik Formation (Fm.) is the most prolific. The decline in conventional hydrocarbon production on the North Slope and the presence of high quality source rocks inspire the evaluation of the Shublik Fm. as an unconventional petroleum system where oil or gas are produced directly from source rocks. The Shublik Fm. is a heterogeneous calcareous shale and limestone interval that has been interpreted to indicate deposition influenced by marine upwelling. Lithofacies observed in outcrop consist of intervals of non-resistant organic-rich packages that are interbedded with resistant coarsening upward rhythmic depositional successions of phosphatic and carbonate parasequences. The heterogenous characteristics of the microfacies is one of the challenges in the unconventional exploration of the Shublik Fm. Detailed microfacies descriptions, as part of this study, document the complex lithologies and identify patterns in the occurrence of the microfacies. Microfacies descriptions are the building blocks to identify stacking patterns that define the parasequences. The parasequences observed in core, outcrop, and petrographic analysis are calibrated to well logs to map relevant stratigraphic intervals on a regional scale. A targeted interval for the unconventional exploration of the Shublik Fm. is identified using a relative brittleness index. Flat clam and phosphatic parasequences are the primary packages present within the targeted interval. The parasequences are comprised of small-scale brittle and ductile couplets. High resolution pore imaging and mechanical stratigraphy characteristics are documented within the interval. Pore types and networks provide potential storage and migration pathways within unconventional resource systems. Pore types were imaged at a high resolution using scanning electron microscopy. Pore types that are present within the Shublik Fm. include interparticle, intraparticle, porous floccules, moldic, microfracture, and microchannel. The phosphatic limestone facies contains the greatest amount of porosity including interparticle, intraparticle, and moldic within the phosphate nodules and matrix and fractures surrounding phosphate nodules. Microfracture, microchannel, and intraparticle porosity are the primary pore types within the flat clam facies. Mechanical stratigraphy has a direct impact on the success of hydraulic fracturing. The microfacies descriptions identify laminae scale mechanical stratigraphy characteristics which include erosional surfaces, laminations, graded bedding, mineralogical variation, and textural anisotropy and isotropy. A regional correlation of the targeted interval was developed building upon previous work and utilizing sequence stratigraphic models. Significant parasequence surfaces are readily identified in the well log signatures. The challenge of the heterogeneity of the Shublik Fm. is simplified first by identifying a targeted interval consisting of brittle and ductile packages enriched in TOC. Then recognizing the parasequences contained as part of the interval which include significant characteristics pertaining to pore networks and mechanical stratigraphy. Combining methods and results of this study provides an important component to evaluating the Shublik Fm. as a potential unconventional resource system.

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#### **CANADIAN JOURNAL OF EARTH SCIENCES**

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#### **AN ASSESSMENT OF IN-PLACE GAS RESOURCES IN LOW-PERMEABILITY UPPER CRETACEOUS AND LOWER TERTIARY SANDSTONE RESERVOIRS, WIND RIVER BASIN, WYOMING**

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#### **PETROLEUM GEOLOGY OF LIBYA**

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Elsevier Petroleum Geology of Libya, Second Edition, systematically reviews the exploration history, plate tectonics, structural evolution, stratigraphy, geochemistry and petroleum systems of Libya, and includes valuable new chapters on oil and gas fields, production, and reserves. Since the previous edition, published in 2002, there have been numerous developments in Libya, including the lifting of sanctions, a new licensing system, with licensing rounds in 2004, 2005, 2006, and 2007, many new exploratory wells, discoveries and field developments, and a change of regime. A large amount of new data has been published on the geology of Libya in the past fourteen years, but it is widely scattered through the literature. Much of the older data has been superseded, and several of the key publications, especially those published in Libya, are difficult to access. This second edition provides an updated source of reference which incorporates much new information, particularly on petroleum systems, reserves, oil and gas fields, play fairways, and remaining potential. It presents the results of recent research and a detailed description of Libyan offshore geology. The book includes an extensive and comprehensive bibliography. Presents over 180 full colour illustrations including maps, diagrams and charts, illustrating the key concepts in a clear and concise manner Authored by two recognized world authorities on geology in Libya, with over 40 years' experience in Libya between them Provides an expanded and updated version of the bestselling previous edition, nicknamed the Explorationist's Bible Lays the foundation for the post-revolution exploration age in Libya

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#### **UNCONVENTIONAL GAS RECOVERY (UGR) INFORMATION FILE**

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#### **ADVANCES IN SUBSURFACE DATA ANALYTICS**

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Elsevier Advances in Subsurface Data Analytics: Traditional and Physics-Based Approaches brings together the fundamentals of popular and emerging machine learning (ML) algorithms with their applications in subsurface analysis, including geology, geophysics, petrophysics, and reservoir engineering. The book is divided into four parts: traditional ML, deep learning, physics-based ML, and new directions, with an increasing level of diversity and complexity of topics. Each chapter focuses on one ML algorithm with a detailed workflow for a specific application in geosciences. Some chapters also compare the results from an algorithm with others to better equip the readers with different strategies to implement automated workflows for subsurface analysis. Advances in Subsurface Data Analytics: Traditional and Physics-Based Approaches will help researchers in academia and professional geoscientists working on the subsurface-related problems (oil and gas, geothermal, carbon sequestration, and seismology) at different scales to understand and appreciate current trends in ML approaches, their applications, advances and limitations, and future potential in geosciences by bringing together several contributions in a single volume. Covers fundamentals of simple machine learning and deep learning algorithms, and physics-based approaches written by practitioners in academia and industry Presents detailed case studies of individual machine learning algorithms and optimal strategies in subsurface characterization around the world Offers an analysis of future trends in machine learning in geosciences

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#### **BP STATISTICAL REVIEW OF WORLD ENERGY**

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#### **PETROLEUM GEOCHEMISTRY AND EXPLORATION IN THE AFRO-ASIAN REGION**

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#### **PROCEEDINGS OF THE 6TH AAPG INTERNATIONAL CONFERENCE, BEIJING, CHINA, 12-14 OCTOBER 2004**

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CRC Press Petroleum Geochemistry and Exploration in the Afro-Asian Region includes 29 papers presented at the 6th International Conference on Petroleum Geochemistry and Exploration in the Afro-Asian Region. Petroleum geochemistry has played a crucial role in determining effective source rocks, classifying petroleum systems and delineating the geneses of conventional and unconventional oils and gases. By reference to petroleum geochemistry, the dynamic process of petroleum accumulations can be traced, which helps determining the prospecting target areas and reducing the exploration risk. Petroleum exploration is also enhanced by basin modeling and petroleum system classification, through the application of geochemical data. There has been significant progress in petroleum exploration due to the application of molecular geochemistry and biomarkers. Advances in this area include the identification and application of age-indicating biomarkers, the application of diamondoids in appraising the cracking level of crude oils, and the application of the compound-specific isotope analysis of biomarkers and the compound-specific isotope analysis of diamondoids (CSIAB and CSIAD) in oil-source correlation and quantitative identification of source-commingled oils. In reconstructing the history of oil and gas accumulations, three other techniques are of note: the dynamics of hydrocarbon generation, the dynamics of carbon isotopic fractionation and the analysis of liquid historical recordings (inclusions). Petroleum Geochemistry and Exploration in the Afro-Asian Region is an invaluable source of information for oil and gas explorers, petroleum geochemists and students of petroleum geochemistry. Researchers in petroleum companies and institutes will also find this publication useful.