Methods Of Exploration And Production Of Petroleum Resources

Hydrocarbon exploration and production incorporate great technology challenges for the oil and gas industry. In order to meet the world's future demand for oil and gas, further technological advance is needed, which in turn requires research across multiple disciplines, including mathematics, geophysics, geology, petroleum engineering, signal processing, and computer science. This book addresses important aspects and fundamental concepts in hydrocarbon exploration and production. Moreover, new developments and recent advances in the relevant research areas are discussed, whereby special emphasis is placed on mathematical methods and modelling. The book reflects the multi-disciplinary character of the hydrocarbon production workflow, ranging from seismic data imaging, seismic analysis and interpretation and geological model building, to numerical reservoir simulation. Various challenges concerning the production workflow are discussed in detail. The thirteen chapters of this joint work, authored by international experts from academic and industrial institutions, include survey papers of expository character as well as original research articles. Large parts of the material presented in this book were developed between November 2000 and April 2004 through the European research and training network NetAGES, "Network for Automated Geometry Extraction from Seismic". The new methods described here are currently being implemented as software tools at Schlumberger Stavanger Research, one of the world's largest service providers to the oil industry.

This third edition of Elements of Petroleum Geology is completely updated and revised to reflect the vast changes in the years since publication of the First Edition. This book is a useful primer for geophysicists, geologists, and petroleum engineers in the oil industry who wish to expand their knowledge beyond their specialized area. It is also an excellent introductory text for a university course in petroleum geoscience. Elements of Petroleum Geology begins with an account of the physical and chemical properties of petroleum, reviewing methods of petroleum exploration and production. These methods include drilling, geophysical exploration techniques, wireline logging, and subsurface geological mapping. After describing the temperatures and pressures of the subsurface environment and the hydrodynamics of connate fluids, Selley examines the generation and migration of petroleum, reservoir rocks and trapping mechanisms, and the habit of petroleum in sedimentary basins. The book contains an account of the composition and formation of tar sands and oil shales, and concludes with a brief review of prospect risk analysis, reserve estimation, and other economic topics. Updates the first edition completely Reviews the concepts and methodology of petroleum exploration and production Written by a preeminent petroleum geologist and sedimentologist with 30 years of petroleum exploration in remote corners of the world Contains information pertinent to geophysicists, geologists, and petroleum reservoir engineers

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.

Geophysical methods are essential for logging and seismic exploration, and recently electromagnetic methods have also been used in exploration and production. Most universities do not offer specific courses in petroleum geology/geophysics and only a few have a Masters or Ph.D. programmes in this field. Oil companies therefore recruit many geologists with little training in these subjects. In this book we have tried to give a basic introduction to disciplines relevant to petroleum exploration and we have also included some aspects of petroleum production. Consequently, geophysical exploration is of importance not only to geophysicists but also to geologists, physicists, engineers and archaeologists. The book covers the physical principles, methodology, interpretational procedures and fields of application of the various survey methods. Methods and Applications in Petroleum and Mineral Exploration and Engineering Geology is an interdisciplinary book bridging the fields of earth sciences and engineering. It covers topics on natural resources exploration as well as the application of geological exploration methods and techniques to engineering problems. Each topic is presented through theoretical approaches that are illustrated by case studies from around the globe. Methods and Applications in Petroleum and Mineral Exploration and Engineering Geology is a key resource for both academics and professionals, offering both practical and applied knowledge in resources exploration and engineering geology. Features new exploration technologies including seismic, satellite images, basin studies, geochemical modeling and analysis Presents cases studies from different countries such as the Hoggar area (Algeria), Urals and Siberia (Russia), North of Chile (II and III regions), and North of Italy (Trentino Alto adige) Includes applications of the novel methods discussed

This book describes aspects of the natural gas hydrate (NGH) system that offer opportunities for the innovative application of existing technology and development of new technology that could dramatically lower the cost of NGH exploration and production. It is written for energy industry professionals and those concerned with energy choices and efficiencies at a university graduate level. The NGH resource is compared with physical, environmental, and commercial aspects of other gas resources. The authors’ theme is that natural gas can provide for base and peak load energy demands during the transition to and possibly within a renewable energy future. This is possibly the most useful book discussing fossil fuels that will be a reference for environmentalists and energy policy institutions, and for the environmental and energy community.

This book presents several intelligent approaches for tackling and solving challenging practical problems facing those in the petroleum geosciences and petroleum industry. Written by experienced academics, this book offers state-of-the-art working examples and provides the reader with exposure to the latest developments in the field of intelligent methods applied to oil and gas research, exploration and production. It also analyzes the strengths and weaknesses of each method presented using benchmarking, whilst also emphasizing essential
parameters such as robustness, accuracy, speed of convergence, computer
time, overlearning and the role of normalization. The intelligent approaches
presented include artificial neural networks, fuzzy logic, active learning method,
genetic algorithms and support vector machines, amongst others. Integration,
handling data of immense size and uncertainty, and dealing with risk
management are among crucial issues in petroleum geosciences. The problems
we have to solve in this domain are becoming too complex to rely on a single
discipline for effective solutions and the costs associated with poor predictions
(e.g. dry holes) increase. Therefore, there is a need to establish a new approach
aimed at proper integration of disciplines (such as petroleum engineering,
geology, geophysics and geochemistry), data fusion, risk reduction and
uncertainty management. These intelligent techniques can be used for
uncertainty analysis, risk assessment, data fusion and mining, data analysis and
interpretation, and knowledge discovery, from diverse data such as 3-D seismic,
geological data, well logging, and production data. This book is intended for
petroleum scientists, data miners, data scientists and professionals and post-
graduate students involved in petroleum industry.

The application of surface geochemical methods to finding petroleum is based on
the detection of hydrocarbons in the soil that have leaked from a petroleum
reservoir at depth. While the seal over the deposit was once considered
impermeable, surface geochemistry data now show that such leakage is a
common occurrence. Despite its simplicity and low costs, surface geochemistry
remains controversial because, until now, there was no objective and in-depth
treatment of the various methods of surface geochemistry for oil exploration.

Written by a successful oil finder, this practical guide: * surveys a broad array of
surface geochemistry techniques, from soil gases to microbiology, and provides
clear strategies for applying them to the high-stakes art of petroleum exploration *
offers numerous case studies, both successes and failures, to show the strengths
and weaknesses of different approaches * examines statistical and spatial
variation, surveys and models in surface geochemistry, demonstrating how each
analytical tool can be used to optimize accuracy * integrates surface
geochemistry data interpretation with data from conventional methods of oil
exploration, and considers the economics of surface geochemical approaches *
discusses key topics that have been neglected in the literature, such as grid
design and the effects of soils. Geologists, geophysicists, geological engineers
and exploration managers involved in petroleum exploration will gain valuable
insights from this volume. By presenting and evaluating each method of surface
geochemistry in a neutral tone, this book enables the reader to select and employ
these methods with greater confidence.

This publication, prepared in cooperation with the oil industry's Exploration
Production Forum, sets out the oil exploration process, describes the potential
environmental consequences of exploration and recommends measures for the
prevention or minimization of adverse impacts. The material is based on the
experience of IUCN's Environmental Assessment Service.
The steps that lead to the production of oil and gas are diverse, complex and costly. They are diverse because the detection of oil and gas involves input from many specialties, ranging from geology to reservoir engineering. They are complex, as shown by the development of the job of the petroleum architect, who coordinates all the operations. They are costly, as the investments for exploration and production represent more than half of all investments in the oil and gas sector. Moreover, exploration is a risky activity, both from the technical and financial viewpoint: only one well in five produces marketable oil. Meanwhile, the areas for exploration and production are spread throughout the world.

With contributions by D. Babusiaux (IFP Energies nouvelles), S. Barreau (IFP Energies nouvelles), P.-R. Bauquis (Total), N. Bret-Rouzaut (IFP Energies nouvelles), A. Chétrit (Total), P. Copinschi (IFP Energies nouvelles), J.-P. Favennec (IFP Energies nouvelles), R. Festor (Total), E. Feuillet-Midrier (IFP Energies nouvelles), M. Grossin (Total), D. Guirauden (Beicip), V. Lepez (Total), P. Sigonney (Total) et M. Valette (Total). The first edition of this book has been selected for inclusion in Choice’s annual Outstanding Academic titles list. It has been rewarded for its excellence in scholarship and presentation, the significance of its contribution to the field, and its value as important treatment of the subject.

The steps that lead to the production of oil and gas are diverse, complex and costly. They are diverse because the detection of oil and gas involves input from many specialties, ranging from geology to reservoir engineering. They are complex, as shown by the development of the job of the petroleum architect, who coordinates all the operations. They are costly, as the investments for exploration and production represent more than half of all investments in the oil and gas sector. Moreover, exploration is a risky activity, both from the technical and financial viewpoint: only one well in five produces marketable oil. Meanwhile, the areas for exploration and production are spread throughout the world. This book provides a complete overview of the stakes and challenges involved in oil and gas exploration and production. Following a historical review and a survey of the markets, the technical phases are covered, as are the evaluation of reserves, the estimation of investments and costs, the decision-making and control processes, and the accounting, legal and contractual environment for these activities. The book concludes with a discussion of the role of safety, and of environmental and ethical issues. This work, which is designed for readers concerned with the various aspects of the oil and gas upstream sector, is accessible to all. This second edition takes into account the huge changes in the oil and gas industry, particularly the large increases in oil prices, investments and costs observed since the first edition. This book is available in French under the title "Recherche et production du pétrole et du gaz". Contents : 1. Petroleum: a strategic product. 2. Oil and gas exploration and production. 3. Hydrocarbon reserves. 4. Investments and costs. 5. Legal, fiscal and contractual framework. 6. Decision-making on exploration and production. 7. Information, accounting and

Enhance Oil and Gas Exploration with Data-Driven Geophysical and Petrophysical Models
John Wiley & Sons

Geologic description of an area of metasedimentary and metavolcanic rocks ("greenstone"), a quartz monzonite pluton, and a variety of granitic gneisses. Provides details on exploration and drilling, including problems, techniques and evaluating/completing a well and, finally, production. As well as examining exploration, drilling and production methods, the book also covers basic language used in the petroleum industry.

OBJECTIVES: To characterize rapid reviews and similar products, to understand the context in which rapid products are produced (e.g., end-users and purposes for rapid products), to understand methodological guidance and strategies used to make products rapid and describe how these differ from systematic review (SR) procedures, and to identify empiric evidence on the impact of methodological approaches on their reliability and validity.

METHODS: We searched the literature to identify rapid review methods, empiric evidence on rapid review methodology, and methodological guidance. We conducted interviews with members of organizations known to produce rapid reviews to characterize the types of rapid products produced and to understand the context and uses for rapid products, identify current practices, and understand the evolution of their programs and products. RESULTS: We identified 36 examples of rapid products produced by 20 organizations with production time ranging from 5 minutes to 8 months. We categorized rapid products into four groups based on the extent of synthesis: (1) "inventories" list what evidence is available, and other contextual information needed to make decisions, but do not synthesize the evidence or present summaries or conclusions; (2) "rapid responses" present the end-user with an answer based on the best available evidence (usually guidelines or SRs), but do not attempt to formally synthesize the evidence into conclusions; (3) "rapid reviews" perform a synthesis (qualitative and/or quantitative) to provide an answer about the direction of evidence and possibly the strength of evidence; (4) "automated approaches" use databases of extracted study elements and programming to generate meta-analyses in response to user-defined queries. Methodological approaches identified for rapid products include: searching fewer databases; limited use of grey literature; restricting the types of studies included (e.g., English only, most recent 5 years); relying on existing SRs; limiting full-text review; limiting dual review for study selection and/or data extraction; limiting data extraction; limiting risk of bias assessment or grading; minimal evidence synthesis; providing nominal conclusions or recommendations; and limiting external peer review. As the timeframes for products lengthened many limitations were lifted; however, there were still restrictions on database searching, inclusion, extent of data extraction, and dual review. With lengthened production time, there was more often risk of bias assessment, evidence grading, and external peer review. Key informant interviews demonstrated that the essence of rapid products differs from that of SRs: key differences include the close relationship with the end-user and focus on helping a specific end-user make a specific decision in an identified timeframe. Because there may not be lead time before the review is needed and the end-user may need the review urgently, maintaining a highly
skilled staff is critical to organizational readiness to produce rapid reviews. Having few and/or narrow questions (e.g., emerging technologies, single interventions, specific populations) was also necessary. There is almost no empiric evidence directly comparing results of rapid products with SRs. One report suggested there may not be any impact; however, it focused on surgical interventions and may not be generalizable to other clinical specialties or health care fields in which rapid products or SRs are conducted. CONCLUSIONS: Rapid products have tremendous methodological variation. Overall, they vary on two important dimensions that are captured by the term "rapid review": the timeframe for completion and extent of synthesis. The similarity of rapid products lies in their close relationship with the end-user to meet decisionmaking needs in a limited timeframe. The following are considerations for creating rapid products: 1. products should be developed in the context of identified end-users and their specific decisionmaking needs and circumstances; 2. a close relationship with the end-user and iterative feedback is essential; 3. reliance on existing SRs require methods to summarize and interpret evidence; 4. a highly skilled and experienced staff and the capacity to mobilize skilled staff quickly are critical; 5. restricting scope may be necessary; 6. producers and users need to accept modifications to standard SR methods; and 7. limitations need to be clearly reported, particularly in terms of potential bias and shortcomings of the conclusions. Future research evaluating end-user perspectives will complement these findings and provide additional considerations for those interested in establishing a rapid response program or producing rapid products. Leverage Big Data analytics methodologies to add value to geophysical and petrophysical exploration data. Enhance Oil & Gas Exploration with Data-Driven Geophysical and Petrophysical Models demonstrates a new approach to geophysics and petrophysics data analysis using the latest methods drawn from Big Data. Written by two geophysicists with a combined 30 years in the industry, this book shows you how to leverage continually maturing computational intelligence to gain deeper insight from specific exploration data. Case studies illustrate the value propositions of this alternative analytical workflow, and in-depth discussion addresses the many Big Data issues in geophysics and petrophysics. From data collection and context through real-world everyday applications, this book provides an essential resource for anyone involved in oil and gas exploration. Recent and continual advances in machine learning are driving a rapid increase in empirical modeling capabilities. This book shows you how these new tools and methodologies can enhance geophysical and petrophysical data analysis, increasing the value of your exploration data. Apply data-driven modeling concepts in a geophysical and petrophysical context. Learn how to get more information out of models and simulations. Add value to everyday tasks with the appropriate Big Data application. Adjust methodology to suit diverse geophysical and petrophysical contexts. Data-driven modeling focuses on analyzing the total data within a system, with the goal of uncovering connections between input and output without definitive knowledge of the system's physical behavior. This multi-faceted approach pushes the boundaries of conventional modeling, and brings diverse fields of study together to apply new information and technology in new and more valuable ways. Enhance Oil & Gas Exploration with Data-Driven Geophysical and Petrophysical Models takes you beyond traditional deterministic interpretation to the future of exploration data analysis. This is a comprehensive guide to the workings of the world's commodity and financial
futures and options markets. It examines the markets and instruments - including the OTC market and evaluates the likely developments in futures and options. This book looks at how modern developments have enhanced the utility of basin analysis in hydrocarbon exploration. A major factor is modern computing power, which enables complex Monte Carlo-type calculations to be rapidly carried out; a second is the transfer of concepts from the economic arena to the theatre of hydrocarbon production, for example setting risking procedures to cope with data uncertainties. In addition now there are available powerful methods for handling the determination of parameters in the highly non-linear world of equations describing various facets of basin analysis. Th.

This book describes and analyzes the geological basis for the current world petroleum situation. It explains the formation and accumulation of conventional and unconventional oil and gas and the methods used by geologists in the search for petroleum and petroleum-containing basins. The authors examine four recent traditional assessments of the nation's potential supply of natural gas and oil resources. They suggest a new methodology: estimating viable resource, which is the gas and oil resource that is available when exploration and production costs, infrastructure and transportation costs, and environmental impacts are considered. This methodology will be used in future research on specific geographic areas. The authors examine four recent traditional assessments of the nation's potential supply of natural gas and oil resources. The assessments were done by the U.S. Geological Survey National Oil and Gas Resource Assessment Team, the Minerals Management Service, the National Petroleum Council, and the Potential Gas Committee. Although the assessments vary, they each indicate that the Intermountain West contains substantial natural gas and oil resources. Traditional resource assessments, however, are intended to estimate the technically recoverable resource, which does not reflect the amount of resource that can realistically be produced. This report lays the foundation for determining the viable gas and oil resource: that which is available when exploration and production costs, infrastructure and transportation costs, and environmental impacts are considered. The next step in the research will be to apply this methodology to estimate the viable resource in individual geographic areas. The analysis will specify the relationships among gas and oil deposits, technological options, economic costs, infrastructure requirements, environmental impacts, and other variables to allow for a comprehensive assessment of the viable gas and oil resource.

This book presents unique features of the adaptive modeling approach based on new machine learning algorithms for petroleum exploration, development, and production. The adaptive approach helps simulation engineers and geoscientists to create adequate geological and hydrodynamic models. This approach is proven to be a real alternative to traditional techniques, such as deterministic modeling. Currently, machine-learning algorithms grow in popularity because they provide consistency, predictiveness, and convenience. The primary purpose
of this book is to describe the theoretical state of the adaptive approach and show some examples of its implementation in simulation and forecasting different reservoir processes.

This book offers a general introduction to non-technical aspect of oil and gas management. To some people, the book deals with almost all aspects of the oil and gas resource management, including legal, finance, investment, history, taxation, revenue management, and market developments. This book is written primarily to help oil and gas management students understand the subject matter broadly. The book is also helpful to policymakers, petroleum economists, policy analysts, and individuals to have basic understanding of the major issues relevant to the oil and gas sector. Topics such as petroleum subsidy, local content, stabilization agreements, oil revenue collateralization, and investment of the Ghana Petroleum Funds are discussed from a non-technical perspective. The Dutch disease and natural resource curse, the governance pillars in oil and gas revenue management, and the Hubbert curve are also covered with clear explanations. The discussion on the Seven Sisters in oil and gas market development forms the historical dimension to the global oil and gas market.

In the decades that followed World War II, cheap and plentiful oil helped to fuel rapid economic growth, ensure political stability, and reinforce the legitimacy of liberal democracies. Yet waves of price increases and the use of the so-called “oil weapon” by a group of Arab oil-producing countries in the early 1970s demonstrated the West’s dependence on this vital resource and its vulnerability to economic volatility and political conflicts. Oil and Sovereignty analyzes the national and international strategies that American and European governments formulated to restructure the world of oil and deal with the era’s disruptions. It shows how a variety of different actors combined diplomacy, knowledge creation, economic restructuring, and public relations in their attempts to impose stability and reassert national sovereignty.

Relates how a new technique used in the study of soil gas can be applied to the prospecting of oil, gas, mineral and geothermal resources. The text should interest petroleum and mineral engineers and others who need to keep abreast of developments in the field of natural resource exploration.

For many engineers, statistics is the method of last resort, when no deterministic method can be found to make sense of geological complexities. This volume shows that geological data and geology often have a mutually beneficial effect especially in the diagnosis of complex geological phenomena.

Developments in Economic Geology, 7: Nuclear Methods in Mineral Exploration and Production elaborates on the status of applicable nuclear techniques used in mineral exploration and production. The selection first offers information on radiometric methods and X-ray analysis in mineral exploration. Discussions focus on gamma-ray spectrometry, radon detection, autoradiography of uranium and thorium, X-ray diffraction, and application of X-ray analysis. The text then examines X-ray fluorescence geochemical analysis on the surface of Mars and radioactivation methods, as well as nuclear geochemical measurements of planetary surface; radioactivation methods for mineral exploration; and radioactivation sources. The publication takes a look at nuclear well logging for petroleum and the potential of plowshare for
resource development. Topics include natural radiation, induced logs, description of potential applications related to energy resources, and obstacles to the development of a commercial plowshare program in the U.S. The selection is a dependable source of data for readers interested in the use of nuclear techniques in mineral production and exploration.

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