Integrated Well Log Vsp And Surface Seismic Analysis Of

This book investigates geological CO2 storage and its role in greenhouse gas emissions reduction, enhanced oil recovery, and environmentally responsible use of fossil fuels. Written for energy/environmental regulators at every level of government (federal, state, etc.), scientists/academics, representatives from the power and fossil energy sectors, NGOs, and other interested parties, this book uses the characterization of the Rock Springs Uplift site in Wyoming as an integrated case study to illustrate the application of geological CO2 storage science, principles, and theory in a real-world scenario.

The Russian Federation is a leading oil producer and has a major oil supply system. This book describes the current Russian situation and prospects for the future development of its industry. Accurate data on the Russian system of oil pipelines are published here in English for the first time and will be useful to those interested or involved in the oil business. The book provides information on technologies used, including their technical and economic characteristics and current research. Part I discusses oil reserves and current resource base, prospects for their development, potential oil reserves, and those already explored. Part II discusses conditions under which oil is produced and describes features particular to Russian oil production, associated problems and technologies, including their engineering and economic aspects. Part III highlights the background, current state, and operational problems of the oil transportation system of the Federation and other countries of the former Soviet Union - one of the world's largest energy systems. Also reviewed are the technical state and

operational reliability of the main pipeline network, including a general description of the pipeline system, design and construction of oil pipelines, repair and maintenance, and economic and control problems.
This book comprehensively introduces the drilling theory and practice behind CCSD-1 well drilling, the first stage of a key national scientific engineering project of China. In addition to access to variety of data and information accumulated decade during the project's decade-long operation, readers also gain insight into state-of-the-art techniques and most recent achievements in China's scientific drilling industry. Specifically, this work introduces the drilling engineering design, well site construction, and equipment and construction situation. It also provides a minute description on the new techniques that were developed for tackling the technical difficulties, expounds in detail the core drilling techniques for hard rock deep well, and treats diamond core drill bits, reaming drilling techniques in hard crystalline rocks, well-deviation control techniques for strong dipping strata, and much more. In summary, this book offers a valuable resource for engineers and technicians who engage in scientific drilling and a variety of resource drilling engineering; teachers and students who are interested in this field will also gain plentiful information. Prof. Da Wang, the former deputy director of China Geological Survey, was the director of the Engineering Centre, chief engineer and drill-site general director of China Continental Scientific Drilling Project.
This text features 105 papers dealing with the fundamentals and the applications of poromechanics from the Biot conference of 1998, held in Louvain-la-Neuve. Topics include: wave propogation; numerical modelling; identification of poromechanical parameters; and constitutive modelling. Today, the major challenge in reservoir characterization is integrating data coming from different sources in varying

scales, in order to obtain an accurate and high-resolution reservoir model. The role of seismic data in this integration is often limited to providing a structural model for the reservoir. Its relatively low resolution usually limits its further use. However, its areal coverage and availability suggest that it has the potential of providing valuable data for more detailed reservoir characterization studies through the process of seismic inversion. In this paper, a novel intelligent seismic inversion methodology is presented to achieve a desirable correlation between relatively low-frequency seismic signals, and the much higher frequency wireline-log data. Vertical seismic profile (VSP) is used as an intermediate step between the well logs and the surface seismic. A synthetic seismic model is developed by using real data and seismic interpretation. In the example presented here, the model represents the Atoka and Morrow formations, and the overlying Pennsylvanian sequence of the Buffalo Valley Field in New Mexico. Generalized regression neural network (GRNN) is used to build two independent correlation models between; (1) Surface seismic and VSP, (2) VSP and well logs. After generating virtual VSP's from the surface seismic, well logs are predicted by using the correlation between VSP and well logs. The values of the density log, which is a surrogate for reservoir porosity, are predicted for each seismic trace through the seismic line with a classification approach having a correlation coefficient of 0.81. The same methodology is then applied to real data taken from the Buffalo Valley Field, to predict inter-well gamma ray and neutron porosity logs through the seismic line of interest. The same procedure can be applied to a complete 3D seismic block to obtain 3D distributions of reservoir properties with less uncertainty than the geostatistical estimation methods. The intelligent seismic inversion method should help to increase the success of drilling new wells during field

development.
Geophysical InversionSIAM
All too often, senior reservoir managers have found that their junior staff lack an adequate understanding of reservoir management techniques and best practices needed to optimize the development of oil and gas fields. Written by an expert professional/educator, Integrated Reservoir Asset Management introduces the reader to the processes and modeling paradigms needed to develop the skills to increase reservoir output and profitability and decrease guesswork. One of the only references to recognize the technical diversity of modern reservoir management teams, Fanchi seamlessly brings together concepts and terminology, creating an interdisciplinary approach for solving everyday problems. The book starts with an overview of reservoir management, fluids, geological principles used to characterization, and two key reservoir parameters (porosity and permeability). This is followed by an uncomplicated review of multi-phase fluid flow equations, an overview of the reservoir flow modeling process and fluid displacement concepts. All exercises and case studies are based on the authors 30 years of experience and appear at the conclusion of each chapter with hints in addition of full solutions. In addition, the book will be accompanied by a website featuring supplementary case studies and modeling exercises which is

supported by an author generated computer program. Straightforward methods for characterizing subsurface environments Effortlessly gain and understanding of rock-fluid interaction relationships An uncomplicated overview of both engineering and scientific processes Exercises at the end of each chapter to demonstrate correct application Modeling tools and additional exercise are included on a companion website

This hand guide in the Gulf Drilling Guides series offers practical techniques that are valuable to petrophysicists and engineers in their day-to-day jobs. Based on the author's many years of experience working in oil companies around the world, this guide is a comprehensive collection of techniques and rules of thumb that work. The primary functions of the drilling or petroleum engineer are to ensure that the right operational decisions are made during the course of drilling and testing a well, from data gathering, completion and testing, and thereafter to provide the necessary parameters to enable an accurate static and dynamic model of the reservoir to be constructed. This guide supplies these, and many other, answers to their everyday problems. There are chapters on NMR logging, core analysis, sampling, and interpretation of the data to give the engineer a full picture of the formation. There is no other single guide like this, covering all aspects of well logging

and formation evaluation, completely updated with
the latest techniques and applications. · A valuable
reference dedicated solely to well logging and
formation evaluation. · Comprehensive coverage of
the latest technologies and practices, including,
troubleshooting for stuck pipe, operational decisions,
and logging contracts. · Packed with money-saving
and time saving strategies for the engineer working
in the field.

This book presents the essential principles and
applications of seismic oil-exploration techniques. It
concisely covers all stages in exploration activities
(data field acquisition, data processing and
interpretation), supplementing the main text with a
wealth of (>350) illustrations and figures. The book
concentrates on the physics of the applied principles,
avoiding intricate mathematical treatment and
lengthy theoretical reasoning. A further prominent
feature is the inclusion of a separate chapter on 3D
surveying techniques and another, equally important
chapter on seismic digital signals and the aliasing
problem, which is presented in an accessible form.
The book is designed to meet the needs of both the
academic and industrial worlds. University students
and employees of oil-exploration companies alike
will find the book to be a valuable resource.

A time-lapse Offset Vertical Seismic Profile (OVSP)
data set was acquired as part of a subsurface
monitoring program for geologic sequestration of

CO2. The storage site at Cranfield, near Natchez, Mississippi, is part of a detailed area study (DAS) site for geologic carbon sequestration operated by the U.S. Dept. of Energy's Southeast Regional Carbon Sequestration Partnership (SECARB). The DAS site includes three boreholes, an injection well and two monitoring wells. The project team selected the DAS site to examine CO2 sequestration multiphase fluid flow and pressure at the interwell scale in a brine reservoir. The time-lapse (TL) OVSP was part of an integrated monitoring program that included well logs, crosswell seismic, electrical resistance tomography and 4D surface seismic. The goals of the OVSP were to detect the CO2 induced change in seismic response, give information about the spatial distribution of CO2 near the injection well and to help tie the high-resolution borehole monitoring to the 4D surface data. The VSP data were acquired in well CFU 31-F1, which is the ~3200 m deep CO2 injection well at the DAS site. A preinjection survey was recorded in late 2009 with injection beginning in December 2009, and a post injection survey was conducted in Nov 2010 following injection of about 250 kT of CO2. The sensor array for both surveys was a 50-level, 3-component, Sercel MaxiWave system with 15 m (49 ft) spacing between levels. The source for both surveys was an accelerated weight drop, with different source trucks used for the two surveys.

Consistent time-lapse processing was applied to both data sets. Time-lapse processing generated difference corridor stacks to investigate CO_2 induced reflection amplitude changes from each source point. Corridor stacks were used for amplitude analysis to maximize the signal-to-noise ratio (S/N) for each shot point. Spatial variation in reflectivity (used to 'map' the plume) was similar in magnitude to the corridor stacks but, due to relatively lower S/N, the results were less consistent and more sensitive to processing and therefore are not presented. We examined the overall time-lapse repeatability of the OVSP data using three methods, the NRMS and Predictability (Pred) measures of Kragh and Christie (2002) and the signal-to-distortion ratio (SDR) method of Cantillo (2011). Because time-lapse noise was comparable to the observed change, multiple methods were used to analyze data reliability. The reflections from the top and base reservoir were identified on the corridor stacks by correlation with a synthetic response generated from the well logs. A consistent change in the corridor stack amplitudes from pre- to post-CO_2 injection was found for both the top and base reservoir reflections on all ten shot locations analyzed. In addition to the well-log synthetic response, a finite-difference elastic wave propagation model was built based on rock/fluid properties obtained from well logs, with CO_2 induced changes guided by time-lapse crosswell seismic

tomography (Ajo-Franklin, et al., 2013) acquired at the DAS site. Time-lapse seismic tomography indicated that two reservoir zones were affected by the flood. The modeling established that interpretation of the VSP trough and peak event amplitudes as reflectivity from the top and bottom of reservoir is appropriate even with possible tuning effects. Importantly, this top/base change gives confidence in an interpretation that these changes arise from within the reservoir, not from bounding lithology. The modeled time-lapse change and the observed field data change from 10 shotpoints are in agreement for both magnitude and polarity of amplitude change for top and base of reservoir. Therefore, we conclude the stored CO_2 has been successfully detected and, furthermore, the observed seismic reflection change can be applied to Cranfield's ...

Computational Geo-Electromagnetics: Methods, Models, and Forecasts, Volume Five in the Computational Geophysics series, is devoted to techniques for building of geoelectrical models from electromagnetic data, featuring Bayesian statistical analysis and neural network algorithms. These models are applied to studying the geoelectrical structure of famous volcanoes (i.e., Vesuvio, Kilauea, Elbrus, Komagatake, Hengill) and geothermal zones (i.e., Travale, Italy; Soultz-sous-Forets, Elsace). Methodological recommendations

are given on electromagnetic sounding of faults as well as geothermal and hydrocarbon reservoirs. Techniques for forecasting of petrophysical properties from the electrical resistivity as proxy parameter are also considered. Computational Geo-Electromagnetics: Methods, Models, and Forecasts offers techniques and algorithms for building geoelectrical models under conditions of rare or irregularly distributed EM data and/or lack of prior geological and geophysical information. This volume also includes methodological guidelines on interpretation of electromagnetic sounding data depending on goals of the study. Finally, it details computational algorithms for using electrical resistivity for properties beyond boreholes. Provides algorithms for inversion of incomplete, rare or irregularly distributed EM data Features methodological issues of building geoelectrical models Offers techniques for retrieving petrophysical properties from EM sounding data and well logs Hardcover plus CD
Recognizing the need for education and further research in AVO, the editors have compiled an all-encompassing treatment of this versatile technology. In addition to providing a general introduction to the subject and a review of the current state of the art, this unique volume provides useful reference materials and data plus original contributions at the leading edge of AVO technologies.

The past few decades have witnessed the growth of the Earth Sciences in the pursuit of knowledge and understanding of the planet that we live on. This development addresses the challenging endeavor to enrich human lives with the bounties of Nature as well as to preserve the planet for the generations to come. Solid Earth Geophysics aspires to define and quantify the internal structure and processes of the Earth in terms of the principles of physics and forms the intrinsic framework, which other allied disciplines utilize for more specific investigations. The first edition of the Encyclopedia of Solid Earth Geophysics was published in 1989 by Van Nostrand Reinhold publishing company. More than two decades later, this new volume, edited by Prof. Harsh K. Gupta, represents a thoroughly revised and expanded reference work. It brings together more than 200 articles covering established and new concepts of Geophysics across the various sub-disciplines such as Gravity, Geodesy, Geomagnetism, Seismology, Seismics, Deep Earth Processes, Plate Tectonics, Thermal Domains, Computational Methods, etc. in a systematic and consistent format and standard. It is an authoritative and current reference source with extraordinary width of scope. It draws its unique strength from the expert contributions of editors and authors across the globe. It is designed to serve as a valuable and cherished source of information for current and

future generations of professionals.

Applied Techniques to Integrated Oil and Gas Reservoir Characterization: A Problem-Solution Discussion with Experts presents challenging questions encountered by geoscientists in their day-to-day work in the exploration and development of oil and gas fields and provides potential solutions from experts working in the field. Covers Amplitude Versus Offset (AVO), well-to-seismic tie, phase of seismic data, seismic inversion studies, pore pressure prediction, rock physics and exploration geological. The text examines challenges in the industry as well as the solutions and techniques used to overcome those challenges. Over the past several years there has been a growing integration of geophysical, geological, and reservoir engineering, production and petrophysical data to predict and determine reservoir properties. This includes reservoir extent and sand development away from the well bore, as well as in unpenetrated prospects, leading to optimization planning for field development. As such, geoscientists now must learn the technology, processes and challenges involved within their specific functions in order to complete day-to-day activities. Presents a thorough understanding of the requirements and issues of various disciplines in characterizing a wide spectrum of reservoirs Includes real-life problems and challenging questions encountered by geoscientists

in their day-to-day work, along with answers from experts working in the field Provides an integrated approach among different disciplines (geology, geophysics, petrophysics, and petroleum engineering)

CD-ROM is extracted from the Reservoir and Civil Engineering Geophysics.

This collection of papers on geophysical inversion contains research and survey articles on where the field has been and where it's going, and what is practical and what is not. Topics covered include seismic tomography, migration and inverse scattering.

Following the success of the Drilling Data Handbook, Editions Technip has designed this book to cover the well logging principles and its applications. This well logging handbook first edition starts with a summary on geology and petrophysics focusing mainly on its applications. The wide range of logging measurements and applications is covered through eleven sections, each of them organized into four chapters. All in all, this is a strongly-bound, user-friendly book with useful information for those involved in all aspects and applications of well-logging. The paging is notched and externally labelled alphabetically to allow a quick access.

The first North Sea Oil and Gas Reservoirs Conference was held in Trondheim in 1985 as part of the Norwegian Institute of Technology's 75th anniversary celebrations.

Favourable reactions from the delegates prompted the Committee to re-run the event some three and a half years later, and it is now intended that the Confe rence be held on a regular basis as long as there is a demand for this type of gathering. The objectives of the 1989 Conference, which were broadly similar to those of the previous one, were: (a) to bring together those engaged in various geoscientific and reservoir engineering aspects of North Sea Oil and gas reservoirs in one forum; (b) to demonstrate wherever poSsible the interdependence of the various disciplines and specializations; (c) to promote innovative, synergistic approaches to research and development programmes aimed at North Sea conditions; and (d) to reflect current trends in the reservoir sciences. Naturally there was no place for specialist parallel sessions in a Conference aimed at encouraging interdisciplinary integration and awareness.

This book is a compilation of selected papers from the 10th International Field Exploration and Development Conference (IFEDC 2020). The proceedings focuses on Reservoir Surveillance and Management, Reservoir Evaluation and Dynamic Description, Reservoir Production Stimulation and EOR, Ultra-Tight Reservoir, Unconventional Oil and Gas Resources Technology, Oil and Gas Well Production Testing, Geomechanics. The conference not only provides a platform to exchanges experience, but also promotes the development of scientific research in oil & gas exploration and production. The main audience for the work includes reservoir engineer, geological engineer, enterprise

managers senior engineers as well as professional students.

Petroleum geoscience comprises those geoscientific disciplines which are of greatest significance for the exploration and recovery of oil and gas. These include petroleum geology, of which sedimentary geology is the main foundation along with the contextual and modifying principles of regional, tectonic and structural geology. Additionally, biostratigraphy and micropalaeontology, organic geochemistry, and geophysical exploration and production techniques are all important tools for petroleum geoscientists in the 21st century. This comprehensive textbook present an overview of petroleum geoscience for geologists destined for the petroleum industry. It should also be useful for students interested in environmental geology, engineering geology and other aspects of sedimentary geology

The integrated processing and interpretation of VSP data are developed to work together in order to enhance the final VSP interpretation. Furthermore, the interpretive processing of the VSP data within the case histories are reviewed along with the incorporation of the final VSP results (both near and far offset data) into the integrated geological/geophysical interpretations presented in the case studies. This thesis has attempted to personify the term interpreter/processor as first highlighted in Hardage (1985). The case histories pertain to oil and gas exploration in carbonate reef and sandstones in the Western Canadian Sedimentary Basin (WCSB). The Lanaway case history (Hinds et al., 1994a) pertains to the exploration of the Lanaway/Garrington oil field

located in central Alberta, Canada. The surface seismic interpretation over the reef crest differed dramatically from the isopach of the reef-encasing shales derived from the geological logs of a borehole drilled into the reef crest. To understand the discrepancy, a VSP survey was performed and the data were interpretatively processed. The results were integrated with the known geology of the field area to uncover possible reasons for the surface seismic anomaly. field in central Alberta, Canada, using the far offset VSP survey. Existing surface seismic was used to infer that a well drilled into the interpreted North-east corner of the Ricinus reef would be successful in penetrating oil bearing carbonate reef. The well was drilled: however, the well missed the reef and a near and far offset VSP survey was used to seismically image possible reef buildups in an area around the well. The Fort St. John Graben case history (Hinds et al., 1991a: Hinds et al., 1993a) highlights exploration of a gas-filled channel sandstone using near and far offset (lateral) VSP surveys. An exploration well was drilled within the study area which intersected the target zone sandstone (the basal Kiskatinaw of the Upper Carboniferous). The target sandstone had a high shale content and was not reservoir quality. A near offset and two far offset VSP surveys were run in the exploration well to image out to a distance of 350 m to the North west and to the East of the well. The VSP, surface seismic and geology results (from the geological logs of the exploration and surrounding wells) are integrated to infer a clearer picture of the sand/shale relationships of the basal Kiskatinaw and detailed faulting of ? the Carboniferous

strata around the well and within the surface seismic line area. The Simonette field case history (Hinds et al., 1991 b: Hinds et al., 1993b) involves using VSP results to image the slope of a low-relief carbonate reef. The low-relief reef examined using the VSP data is located at the extreme end of a North-east reef spur of the Simonette Reef located in North-west Alberta, Canada. An exploration well drilled in the low-relief reef penetrated the edge of the reef. The VSP surveys were run in order to infer details of the reef slope. The interpretation of the VSP data was integrated with all other exploration data to infer the location of the crest of the low-relief reef and to assist in determining whether to whipstock the exploration well or not.

This book contains six chapters dealing with the investigation of seismic and sequence stratigraphy and integrated stratigraphy, including the stratigraphic unconformities, in different geological settings and using several techniques and methods, including the seismostratigraphic and the sequence stratigraphic analysis, the field geological survey, the well log stratigraphic interpretation, and the lithologic and paleobotanical data. Book chapters are separated into two main sections: (i) seismic and sequence stratigraphy and (ii) integrated stratigraphy. There are three chapters in the first section, including the application of sequence and seismic stratigraphy to the fine-grained shales, to the fluvial facies and depositional environments, and to the Late Miocene geological structures offshore of Taiwan. In the second section, there are three chapters dealing with the integrated stratigraphic investigation of

Jurassic deposits of the southern Siberian platform, with the stratigraphic unconformities, reviewing the related geological concepts and studying examples from Middle-Upper Paleozoic successions; and, finally, with the integrated stratigraphy of the Cenozoic deposits of the Andean foreland basin (northwestern Argentina). This little book is different. It is written, primarily, for geologists, reservoir engineers, and log analysts. Why? Because today's seismic method is more than a tool for reconnaissance exploration, for finding structures; it has become a tool for studying the discovered reservoir-its extent, its barriers, its variations of thickness, and its trends of porosity. Today, the geophysicist, the geolog ist, the engineer, and the log analyst can do great things together. Because the book is not written primarily for geophysi cists, it can skip much of the "mechanics" of the seismic method. The reader who reaches the last page (bless him!) will not be able to practise the seismic method, but he will understand how the seismic method can help to solve his problems. It may also be of value to those practitioners of the seismic method-in the field or in the processing centre-who already know the mechanics of the method, but would like to take a broader view. 1 1 Seismics and Structure Of all the geophysical methods working from the surface, there is only one which is widely accepted for studies of individual petroleum reservoirs-the seismic reflection method. We would dearly love to have something better, but alas ... Reduced to its essentials, the method is this: we make a bang, and we listen for echoes. Two main areas of offshore activity are addressed in this

book: Site investigation on assessment; and Applications and foundation engineering. The 37 contributions from a wide ranging group of international experts, are resulting from the Offshore Site Investigation and Foundation Behaviour Conference, London, U.K., September 1992. Adequate determination of site conditions can only be achieved by the integrated approach of using geological, geophysical and geotechnical data. Developments in data acquisition techniques are illustrated through case histories in the section on Geotechnical Sampling and Testing. In the section on Advanced Interpretation Techniques and Integrated Interpretations the state of the art of these topics is also illustrated by case histories. A review of foundation behaviour is presented in the section on Gravity Foundations, Foundation Performance Monitoring, Piling Research and Design Criteria. These topics are illustrated in the light of field experience and recent research, in particular that involving full-scale tests and monitoring. This book provides many illustrative figures and much pertinent information to exploration and marine geophysicists, petroleum and offshore engineers and for researchers working these fields.

The past fifteen years has witnessed an explosive growth in the fundamental research and applications of artificial neural networks (ANNs) and fuzzy logic (FL). The main impetus behind this growth has been the ability of such methods to offer solutions not amenable to conventional techniques, particularly in application domains involving pattern recognition, prediction and control. Although the origins of ANNs and FL may be traced back to the 1940s and 1960s, respectively, the most rapid progress has only been achieved in the last fifteen years. This has been due to significant theoretical advances in our understanding of ANNs and FL, complemented by major technological developments in high-speed computing. In geophysics, ANNs and FL have enjoyed

significant success and are now employed routinely in the following areas (amongst others): 1. Exploration Seismology. (a) Seismic data processing (trace editing; first break picking; deconvolution and multiple suppression; wavelet estimation; velocity analysis; noise identification/reduction; statics analysis; dataset matching/prediction, attenuation), (b) AVO analysis, (c) Chimneys, (d) Compression I dimensionality reduction, (e) Shear-wave analysis, (f) Interpretation (event tracking; lithology prediction and well-log analysis; prospect appraisal; hydrocarbon prediction; inversion; reservoir characterisation; quality assessment; tomography). 2. Earthquake Seismology and Subterranean Nuclear Explosions. 3. Mineral Exploration. 4. Electromagnetic I Potential Field Exploration. (a) Electromagnetic methods, (b) Potential field methods, (c) Ground penetrating radar, (d) Remote sensing, (e) inversion.

3C seismic applications provide enhanced rock property characterization of the reservoir that can complement P-wave methods. Continued interest in converted P- to S-waves (PS-waves) and vertical seismic profiles (VSPs) has resulted in the steady development of advanced vector wavefield techniques. PS-wave images along with VSP data can be used to help P-wave interpretation of structure in gas obscured zones, of elastic and fluid properties for lithology discrimination from S-wave impedance and density inversion in unconventional reservoirs, and of fracture characterization and stress monitoring from S-wave birefringence (splitting) analysis. The book, which accompanies the 2016 SEG Distinguished Instructor Short Course, presents an overview of 3C seismic theory and practical application: from fundamentals of PS-waves and VSPs, through to acquisition and processing including interpretation techniques. The emphasis is on unique aspects of vector wavefields, anisotropy, and the important relationships that unify S-waves

and P-waves. Various applications and case studies demonstrate image benefits from PS-waves, elastic properties and fluid discrimination from joint inversion of amplitude variations with offset/angle (AVO/A), and VSP methods for anisotropic velocity model building and improved reservoir imaging. The book will be of interest to geophysicists, geologists, and engineers, especially those involved with or considering the use of AVO/A inversion, fracture/stress characterization analyses, or interpretation in gas-obscured reservoirs.

Although carbonates make up only 20% of the sedimentary rock record, they account for more than 50% of the world's proven oil reserves. Carbonates differ from siliclastics in generation, geomorphology, and diagenesis, all of which modify the mineralogy, porosity, and permeability so important to reservoir quality and 3-D seismic response. The first eight chapters establish the geologic framework and consist of state-of-the-art review papers written by recognized experts in carbonate generation, rock properties, sequence stratigraphy, seismic stratigraphy, and structural deformation. The last 10 chapters illustrate the seismic expression of carbonate terranes through carefully chosen case studies drawn from the United States, Venezuela, Norway, China, Saudi Arabia, Italy, and the Bahamas, augmented by two careful studies of seismic signal-to-noise problems specific to carbonates. A recurring theme in each of these case studies is the importance of integrating seismic and petrophysical control with geologic models to better predict carbonate facies quality and distribution. This book is destined to become a well-worn reference volume that sits easily within reach of every geologist, geophysicist, and engineer involved in the exploration or exploitation of carbonate reservoirs.

The interest in seismic stratigraphic techniques to interpret reflection datasets is well established. The advent of

sophisticated subsurface reservoir studies and 4D monitoring, for optimising the hydrocarbon production in existing fields, does demonstrate the importance of the 3D seismic methodology. The added value of reflection seismics to the petroleum industry has clearly been proven over the last decades. Seismic profiles and 3D cubes form a vast and robust data source to unravel the structure of the subsurface. It gets nowadays exploited in ever greater detail. Larger offsets and velocity anisotropy effects give for instance access to more details on reservoir flow properties like fracture density, porosity and permeability distribution, Elastic inversion and modelling may tell something about the change in petrophysical parameters. Seismic investigations provide a vital tool for the delineation of subtle hydrocarbon traps. They are the basis for understanding the regional basin framework and the stratigraphic subdivision. Seismic stratigraphy combines two very different scales of observation: the seismic and well-control. The systematic approach applied in seismic stratigraphy explains why many workers are using the principles to evaluate their seismic observations. The here presented modern geophysical techniques allow more accurate prediction of the changes in subsurface geology. Dynamics of sedimentary environments are discussed with its relation to global controling factors and a link is made to high-resolution sequence stratigraphy. 'Seismic Stratigraphy Basin Analysis and Reservoir Characterisation' summarizes basic seismic interpretation techniques and demonstrates the benefits of intergrated reservoir studies for hydrocarbon exploration. Topics are presented from a practical point of view and are supported by well-illustrated case histories. The reader (student as well as professional geophysicists, geologists and reservoir engineers) is taken from a basic level to more advanced study techniques. * Overview reflection seismic methods and its limitations. * Link between basic

seismic stratigraphic principles and high resolution sequence stratigraphy. * Description of various techniques for seismic reservoir characterization and synthetic modelling. * Overview nversion techniques, AVO and seismic attributes analysis. The integrated processing and interpretation of VSP data are developed to work together in order to enhance the final VSP interpretation. Furthermore, the interpretive processing of the VSP data within the case histories are reviewed along with the incorporation of the final VSP results (both near and far offset data) into the integrated geological/geophysical interpretations presented in the case studies. This thesis has attempted to personify the term interpreter/processor as first highlighted in Hardage (1985). The case histories pertain to oil and gas exploration in carbonate reef and sandstones in the Western Canadian Sedimentary Basin (WCSB). The Lanaway case history (Hinds et al., 1994a) pertains to the exploration of the Lanaway/Garrington oil field located in central Alberta, Canada. The surface seismic interpretation over the reef crest differed dramatically from the isopach of the reef-encasing shales derived from the geological logs of a borehole drilled into the reef crest. To understand the discrepancy, a VSP survey was performed and the data were interpretatively processed. The results were integrated with the known geology of the field area to uncover possible reasons for the surface seismic anomaly. field in central Alberta, Canada, using the far offset VSP survey. Existing surface seismic was used to infer that a well drilled into the interpreted North-east corner of the Ricinus reef would be successful in penetrating oil bearing carbonate reef. The well was drilled: however, the well missed the reef and a near and far offset VSP survey was used to seismically image possible reef buildups in an area around the well. The Fort St. John Graben case history (Hinds et al., 1991a: Hinds et al., 1993a) highlights exploration of a gas-filled channel sandstone using

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