Geomechanical And Petrophysical Properties Of Mudrocks

Computer Methods and Advances in Geomechanics
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Geological Carbon Storage
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Fundamentals of Gas Shale Reservoirs
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Multi-scale, Structural Analysis of Geomechanical and Petrophysical Properties of Permocarboniferous Red Beds
Proceedings of the Chalk 2018 Conference Imperial College, London on 17 and 18 September 2018
Reservoir Geomechanics
Subsurface Seals and Caprock Integrity
Proceedings of the 2018 European Rock Mechanics Symposium
Geomechanical and Petrophysical Characterization of Longmaxi Formation, South Sichuan Basin, China
A Best Practice Guide
Applied Petroleum Geomechanics
Fundamentals and Principles of Petrophysics
Soft Rock Mechanics and Engineering
Evaluation and Development
Study about Petrophysical and Geomechanical Properties of Bakken Formation
Rock Physics and Geomechanics in the Study of Reservoirs and Repositories
Fundamentals and Applications, Volume 2
Geomechanics and Geodynamics of Rock Masses
Petrophysical Characterization and Fluids Transport in Unconventional Reservoirs
Core Analysis
Geomechanics Applied to the Petroleum Industry
Unconventional Hydrocarbon Resources
Unconventional Oil and Gas Resources Handbook
Petrophysical Properties of Crystalline Rocks
Upscaling Anisotropic Geomechanical Properties Using Backus Averaging and Petrophysical Clusters in the Vaca Muerta Formation
Physical Properties of Rocks
Shale Gas, Tight Oil, and Induced Seismicity

JADON ALESSANDRO

Computer Methods and Advances in Geomechanics Elsevier
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.
Geomechanical and Petrophysical Properties of Mudrocks John Wiley & Sons
Praise for Reservoir Geomechanics: --
Geological Carbon Storage Geological Society of London
Applied Petroleum Geomechanics provides a bridge between theory and practice as a daily use reference that contains direct industry applications. Going beyond the basic fundamentals of rock properties, this guide covers critical field and lab tests, along with interpretations from actual drilling operations and worldwide case studies, including abnormal formation pressures from many major petroleum basins. Rounding out with borehole stability solutions and the geomechanics surrounding hydraulic fracturing and unconventional reservoirs, this comprehensive resource gives petroleum engineers a much-needed guide on how to tackle today’s advanced oil and gas operations. Presents methods in formation evaluation and the most recent advancements in the area, including tools, techniques and success stories Bridges the gap between theory of rock mechanics and practical oil and gas applications Helps readers understand pore pressure calculations and predictions that are critical to shale and hydraulic activity
Vielskalige Strukturanalyse Der Geomechanischen und Petrophysikalischen Eigenschaften Von Permokarbonischen Red Beds John Wiley & Sons
Since the beginning of the US shale gas revolution in 2005, the development of unconventional oil and gas resources has gathered tremendous pace

around the world. This book provides a comprehensive overview of the key geologic, geophysical, and engineering principles that govern the development of unconventional reservoirs. The book begins with a detailed characterization of unconventional reservoir rocks: their composition and microstructure, mechanical properties, and the processes controlling fault slip and fluid flow. A discussion of geomechanical principles follows, including the state of stress, pore pressure, and the importance of fractures and faults. After reviewing the fundamentals of horizontal drilling, multi-stage hydraulic fracturing, and stimulation of slip on pre-existing faults, the key factors impacting hydrocarbon production are explored. The final chapters cover environmental impacts and how to mitigate hazards associated with induced seismicity. This text provides an essential overview for students, researchers, and industry professionals interested in unconventional reservoirs.

Fundamentals of Gas Shale Reservoirs Gulf Professional Publishing

Geotechnical Aspects of Underground Construction in Soft Ground comprises a collection of 112 papers, four general reports on the symposium themes, the Fujita Lecture, three Special Lectures and the Bright Spark Lecture presented at the Tenth International Symposium on Geotechnical Aspects of Underground Construction in Soft Ground, held in Cambridge, United Kingdom, 27-29 June 2022. The symposium is the latest in a series which began in New Delhi in 1994, and was followed by symposia in London (1996), Tokyo (1999), Toulouse (2002), Amsterdam (2005), Shanghai (2008), Rome (2011), Seoul (2014) and Sao Paulo (2017). This was organised by the Geotechnical Research Group at the University of Cambridge, under the auspices of the Technical Committee TC204 of the International Society for Soil Mechanics and Geotechnical Engineering (ISSMGE). Geotechnical Aspects of Underground Construction in Soft Ground includes contributions from more than 25 countries on research, design and construction of underground works in soft ground. The contributions cover: Field case studies Sensing technologies and monitoring for underground construction in soft ground Physical and numerical modelling of tunnels and deep excavations in soft ground Seismic response of underground infrastructure in soft ground Design and application of ground improvement for underground construction Ground movements, interaction with existing structures and mitigation measures The general reports give an overview of the papers submitted to the symposium, covered in four technical sessions. The proceedings include the written version of the five invited lectures covering topics ranging from developments in geotechnical aspects of underground construction, tunnelling and groundwater interaction (short and long-term effects), the influence of earth pressure balance shield tunnelling on pre-convergence and segmental liner loading (field observations, modelling and implications on design). Similar to previous editions, Geotechnical Aspects of Underground Construction in Soft Ground represents a valuable source of reference on the current practice of analysis, design, and construction of tunnels and deep excavations in soft ground. The book is particularly aimed at academics and professionals interested in geotechnical and underground engineering.

Seismic Petrophysics in Quantitative Interpretation John Wiley & Sons

This book offers a practical reference guide to soft rock mechanics for engineers and scientists. Written by recognized experts, it will benefit professionals, contractors, academics, researchers and students working on rock engineering projects in the fields of civil engineering, mining and construction engineering. Soft Rock Mechanics and Engineering covers a specific subject of great relevance in Rock Mechanics – and one that is directly connected to the design of geotechnical structures under difficult ground conditions. The book addresses practical issues related to the geomechanical properties of these types of rock masses and their characterization, while also discussing advances regarding in situ investigation, safety, and monitoring of geotechnical structures in soft rocks. Lastly, it presents important case histories involving tunnelling, dam foundations, coal and open pit mines and landslides.

Structural, Geomechanical and Petrophysical Properties of Shear Zones in the Eastern Aar Massif, Switzerland Editions TECHNIP

Geological Carbon Storage Subsurface Seals and Caprock Integrity Seals and caprocks are an essential component of subsurface hydrogeological systems, guiding the movement and entrapment of hydrocarbon and other fluids. Geological Carbon Storage: Subsurface Seals and Caprock Integrity offers a survey of the wealth of recent scientific work on caprock integrity with a focus on the geological controls of permanent and safe carbon dioxide storage, and the commercial deployment of geological carbon storage. Volume highlights include: Low-permeability rock characterization from the pore scale to the core scale Flow and transport properties of low-permeability rocks Fundamentals of fracture generation, self-healing, and permeability Coupled geochemical, transport and geomechanical processes in caprock Analysis of caprock behavior from natural analogues Geochemical and geophysical monitoring techniques of caprock failure and integrity Potential environmental impacts of carbon dioxide migration on groundwater resources Carbon dioxide leakage mitigation and remediation techniques Geological Carbon Storage: Subsurface Seals and Caprock Integrity is an invaluable resource for geoscientists from academic and research institutions with interests in energy and environment-related problems, as well as professionals in the field.

Concepts, Methodologies, Tools, and Applications Elsevier

RESERVOIR CHARACTERIZATION FUNDAMENTALS AND APPLICATIONS The second volume in the series, “Sustainable Energy Engineering,” written by some of the foremost authorities in the world on reservoir engineering, this groundbreaking new volume presents the most comprehensive and updated new processes, equipment, and practical applications in the field. Long thought of as not being “sustainable,” newly discovered sources of petroleum and newly developed methods for petroleum extraction have made it clear that not only can the petroleum industry march toward sustainability, but it can be made “greener” and more environmentally friendly. Sustainable energy engineering is where the technical, economic, and environmental aspects of energy production intersect and affect each other. This collection of papers covers the strategic and economic implications of methods used to characterize petroleum reservoirs. Born out of the journal by the same name, formerly published by Scrivener Publishing, most of the articles in this volume have been updated, and there are some new additions, as well, to keep the engineer abreast of any updates and new methods in the industry. Truly a snapshot of the state of the art, this groundbreaking volume is a must-have for any petroleum engineer working in the field, environmental engineers, petroleum engineering students, and any other engineer or scientist working with reservoirs. This outstanding new volume: Is a collection of papers on reservoir characterization written by world-renowned engineers and scientists and presents them here, in one volume Contains in-depth coverage of not just the fundamentals of reservoir characterization, but the anomalies and challenges, set in application-based, real-world situations Covers reservoir characterization for the engineer to be able to solve daily problems on the job, whether in the field or in the office Deconstructs myths that are prevalent and deeply rooted in the industry and reconstructs logical solutions Is a valuable resource for the veteran engineer, new hire, or petroleum engineering student

Reservoir Characterization IGI Global

Petrophysical Characterization and Fluids Transport in Unconventional Reservoirs presents a comprehensive look at these new methods and technologies for the petrophysical characterization of unconventional reservoirs, including recent theoretical advances and modeling on fluids transport in unconventional reservoirs. The book is a valuable tool for geoscientists and engineers working in academia and industry. Many novel technologies and approaches, including petrophysics, multi-scale modelling, rock reconstruction and upscaling approaches are discussed, along with the challenge of the development of unconventional reservoirs and the mechanism of multi-phase/multi-scale flow and transport in these structures. Includes both practical and theoretical research for the characterization of unconventional reservoirs Covers the basic approaches and mechanisms for enhanced recovery techniques in unconventional reservoirs Presents the latest research in the fluid transport processes in unconventional reservoirs

Physical Properties of Rocks Elsevier

Geophysical Monitoring for Geologic Carbon Storage Storing carbon dioxide in underground geological formations is emerging as a promising technology to reduce carbon dioxide emissions in the atmosphere. A range of geophysical techniques can be deployed to remotely track carbon dioxide plumes and monitor changes in the subsurface, which is critical for ensuring for safe, long-term storage. Geophysical Monitoring for Geologic Carbon Storage provides a comprehensive review of different geophysical techniques currently in use and being developed, assessing their advantages and limitations. Volume highlights include: Geodetic and surface monitoring techniques Subsurface monitoring using seismic techniques Subsurface monitoring using non-seismic techniques Case studies of geophysical monitoring at different geologic carbon storage sites 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.

Reservoir Geomechanics SEG Books

The Middle and Upper Devonian Horn River Shale, comprising the Evie and Otter Park members and the Muskwa Formation, northeast British Columbia, Canada is recognized as a significant shale gas reservoir in the Western Canada Sedimentary Basin. However, many aspects of this shale formation have not been adequately studied, and the published geochemical, petrophysical and geomechanical data are limited. This work aims to document the controls of geochemical composition variation on petrophysical and geomechanical properties and the relationship of rock composition to lithofacies and stratigraphic sequences. A detailed core-based sedimentological and wireline log analysis was conducted by my colleague Dr. Korhan Ayranci as a parallel study, in order to classify lithofacies, interpret depositional environments and establish sequence stratigraphic framework across the basin. Major and trace elements concentrations, key trace element ratios and Corg-Fe-S relationships were used to understand the effect of sea level fluctuation on detrital flux, redox conditions, productivity and therefore organic carbon enrichment patterns. Detrital sediment flux indicated by the concentration of aluminum and titanium to the basin was found to be higher during transgressions than regressions. Redox conditions, exhibiting strong correlation to TOC content, were the primary controls on the organic carbon deposition. The bottom water conditions are more anoxic during transgressions than regressions. The presence of biogenic silica, identified by crossplot of silica versus zirconium concentrations, makes the use of total silica problematic as a detrital proxy; biogenic silica concentrations may be useful as a proxy for productivity. The depositional environments for the Evie and Muskwa intervals, depositing during high sea level, represented favorable conditions for organic matter accumulation, including anoxic bottom water conditions, high primary productivity and less clastic dilution. The Otter Park Member, deposited during sea level falling stage, has relatively low organic matter concentrations, which may have been due to high clastic dilution and dysoxic to oxic bottom water conditions. Geochemical controls on petrophysical properties (porosity, permeability, pore morphology, pore size and pore throat size distribution) within Horn River shale reservoirs were investigated by an integrated analysis of porosity and permeability measured by helium pynconometry and GRI method, nitrogen adsorption analysis, mercury injection analysis, scanning electron microscopy (SEM) and transmission electron microscopy (TEM). Porosity ranges from 0.62% to 12.04%, and the measured matrix permeability values increase with increasing porosity, ranging between 1.7 and 42.8 nanodarcy. Among the organic matter and inorganic components, TOC content exerts the strongest control on porosity and permeability. Pore size and pore throat size distribution are strongly associated with TOC content, decreasing with increasing TOC content. SEM and TEM images suggest that several kinds of sites for porosity development are present, including organic matter, pyrite framboids, clay platelets, quartz rims, carbonate grains and microfractures. High porosity and permeability are associated with specific depositional facies. Massive and pyritic mudstones, which are rich in TOC and quartz, have relatively high porosity and permeability. Laminated mudstone, bioturbated mudstone and carbonate, which are rich in clay and carbonate content, have relatively low porosity and permeability. Rock mechanical properties were evaluated by hardness measurements and Young's modulus, Poisson's ratio and brittleness calculated from dipole sonic and density log data. Clay content is the most significant factor controlling the brittleness of shale rocks. The effect of quartz content on rock mechanical properties depends on the type of the quartz present in the rock. Authigenic quartz is positively correlated with brittleness, but detrital quartz has little or no effect. Factor analysis indicates that carbonate increases brittleness, while no obvious correlation between TOC content and brittleness was observed in this study. Brittleness in Horn River Shale shows both geographic and stratigraphic variability. Increasing brittleness in the northwest part of the basin largely results from greater distance from the sediment source and decreased clay content. The Otter Park member represents a period of major relative sea level fall and is more ductile than the underlying Evie Member and the overlying Muskwa Formation because of its high clay content.

Techniques for Reservoir Engineering Analysis Scientific Research Publishing, Inc. USA

This book is intended as a reference book for advanced graduate students and research engineers in shale gas development or rock mechanical engineering. Globally, there is widespread interest in exploiting shale gas resources to meet rising energy demands, maintain energy security and stability in supply and reduce dependence on higher carbon sources of energy, namely coal and oil. However, extracting shale gas is a resource intensive process and is dependent on the geological and geomechanical characteristics of the source rocks, making the development of certain

formations uneconomic using current technologies. Therefore, evaluation of the physical and mechanical properties of shale, together with technological advancements, is critical in verifying the economic viability of such formation. Accurate geomechanical information about the rock and its variation through the shale is important since stresses along the wellbore can control fracture initiation and frac development. In addition, hydraulic fracturing has been widely employed to enhance the production of oil and gas from underground reservoirs. Hydraulic fracturing is a complex operation in which the fluid is pumped at a high pressure into a selected section of the wellbore. The interaction between the hydraulic fractures and natural fractures is the key to fracturing effectiveness prediction and high gas development. The development and growth of a hydraulic fracture through the natural fracture systems of shale is probably more complex than can be described here, but may be somewhat predictable if the fracture system and the development of stresses can be explained. As a result, comprehensive shale geomechanical experiments, physical modeling experiment and numerical investigations should be conducted to reveal the fracturing mechanical behaviors of shale.

Engineering in Chalk Editora 34

A symbiosis of a brief description of physical fundamentals of the rock properties (based on typical experimental results and relevant theories and models) with a guide for practical use of different theoretical concepts.

Geomechanics and Hydraulic Fracturing for Shale Reservoirs Springer Nature

Geomechanical processes occurring during steam assisted gravity drainage (SAGD) thermal recovery influence petrophysical and rock mechanical properties of both reservoir and caprock formations. While geostatistical techniques provide multiple equi probable geological realizations for petrophysical properties, rock mechanical properties are traditionally considered as homogenously in reservoir geomechanical simulations of the SAGD process. This research has shown that consideration of heterogeneous facies and rock mechanical properties will result in a larger range of possible outcomes, such as vertical displacement within the reservoir, than simulation models that adopt homogeneous facies and property distributions. Typically, only a select number of geological realizations are selected for simulation. Randomly selecting geological realizations will not accurately represent uncertainty and they should be selected based on appropriate ranking criteria. A ranking criterion, which is in good correlation with expected elastic deformation of reservoir, has been developed in this research. The developed ranking technique is based on expected elastic deformation of each cell considered in numerical simulation of SAGD. Geometrical calibration parameters are adopted within the developed ranking technique. Upscaling of geological models and moving from high resolution geological models to coarse scale simulation models results in reduction of number of cells and accordingly reduction of computational cost. A new numerical technique for upscaling of elastic properties has been proposed. Two major advantages of the new geomechanical upscaling technique include the ability to consider transversely isotropic deformation and independence from coarse scale properties with respect to facies configuration. The ranking and upscaling approaches were applied to a McMurray Formation field case study dataset. In comparison to upscaling techniques based on averaging, the numerical upscaling technique provided a reduction in simulation error. In addition, application of the upscaling technique to real field data confirmed the reduction in computational time for reservoir geomechanical simulations.

Evaluation Of Petrophysical Properties Of Gas Shale And Their Change Due To Interaction With Water CRC Press

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

Proceedings of the Tenth International Symposium on Geotechnical Aspects of Underground Construction in Soft Ground, IS-Cambridge 2022, Cambridge, United Kingdom, 27-29 June 2022 John Wiley & Sons

CO2 capture and geological storage is seen as the most effective technology to rapidly reduce the emission of greenhouse gases into the atmosphere. Up until now and before proceeding to an industrial development of this technology, laboratory research has been conducted for several years and pilot projects have been launched. So far, these studies have mainly focused on transport and geochemical issues and few studies have been dedicated to the geomechanical issues in CO2 storage facilities. The purpose of this book is to give an overview of the multiphysics processes occurring in CO2 storage facilities, with particular attention given to coupled geomechanical problems. The book is divided into three parts. The first part is dedicated to transport processes and focuses on the efficiency of the storage complex and the evaluation of possible leakage paths. The second part deals with issues related to reservoir injectivity and the presence of fractures and occurrence of damage. The final part of the book concerns the serviceability and ageing of the geomaterials whose poromechanical properties may be altered by contact with the injected reactive fluid.

Multi-scale, Structural Analysis of Geomechanical and Petrophysical Properties of Permocarboniferous Red Beds Cambridge University Press

Provides comprehensive information about the key exploration, development and optimization concepts required for gas shale reservoirs Includes statistics about gas shale resources and countries that have shale gas potential Addresses the challenges that oil and gas industries may confront for gas shale reservoir exploration and development Introduces petrophysical analysis, rock physics, geomechanics and passive seismic methods for gas shale plays Details shale gas environmental issues and challenges, economic consideration for gas shale reservoirs Includes case studies of major producing gas shale formations

Proceedings of the Chalk 2018 Conference Imperial College, London on 17 and 18 September 2018 Geological Society of London

The Longmaxi Formation, in the Middle and Upper Yangtze region of China, has much potential for exploration and commercial resource development. This thesis characterizes the Longmaxi marine shale using well logs from two vertical wells and three horizontal wells in the southern Sichuan Basin, China. Geomechanical properties were determined by log data. The maximum permissible hydraulic fracturing net pressure with respect to the maximum fracture height was predicted. According to the log curves in the two vertical wells, there are two apparent boundaries in the Longmaxi Formation. Above the first boundary, the upper lime mudstone and limestone zone are located at the top of an organic shale layer. Below the organic shale zone is a limestone zone. The well logs show low porosity (average 6%) in the organic gas-bearing shale layer. Free gas accounts for about 50% of the total gas. The layer is high in quartz content (50%) and low in clay content (20%). These percentages indicate that the Lower Silurian Longmaxi Formation is brittle, and the lower mechanical moduli of the organic shale layer compared to the adjacent rock layers suggests the ability of this interval to contain the induced fractures. This constrains fracture propagation within the gas-bearing shale layers with respect to the fixed production rate and treatment pressure. According to my results, the maximum permissible net treatment pressure of vertical Well 1 in the fracture is 12.9 MPa, whereas in vertical Well 2 the maximum permissible net pressure is 4.5 MPa because of its thinner shale layer thickness compared to conditions in vertical Well 1.

Reservoir Geomechanics CRC Press

Geomechanics investigates the origin, magnitude and deformational consequences of stresses in the crust. In recent years awareness of geomechanical processes has been heightened by societal debates on fracking, human-induced seismicity, natural geohazards and safety issues with respect to petroleum exploration drilling, carbon sequestration and radioactive waste disposal. This volume explores the common ground linking geomechanics with inter alia economic and petroleum geology, structural geology, petrophysics, seismology, geotechnics, reservoir engineering and production technology. Geomechanics is a rapidly developing field that brings together a broad range of subsurface professionals seeking to use their expertise to solve current challenges in applied and fundamental geoscience. A rich diversity of case studies herein showcase applications of geomechanics to hydrocarbon exploration and field development, natural and artificial geohazards, reservoir stimulation, contemporary tectonics and subsurface fluid flow. These papers provide a representative snapshot of the exciting state of geomechanics and establish it firmly as a flourishing subdiscipline of geology that merits broadest exposure across the academic and corporate geosciences.

Subsurface Seals and Caprock Integrity John Wiley & Sons

"Although carbonate reservoirs hold a wealth of hydrocarbon, they are among the most difficult types of reservoirs to be characterized. Carbonate reservoirs by nature have complex depositional environments and diagenetic processes in which brittle, ductile, fractured rocks, and vugular pores may all exist within small interval. This huge variance in the rock mechanical properties can cause challenges in the reservoir's development, especially in applications related to geomechanics. The main objective of this research is to geomechanically characterize and correlate the carbonate mechanical properties with their petrophysical properties. A comprehensive review for the geomechanical-petrophysical properties of carbonates was conducted from previous studies. Data from offset well have also been used to develop an integrated methodology that examines the uncertainty of carbonate wellbore integrity. The results present a new engineering classification to evaluate the carbonate drillability and deformability. Additional developments regarding the relationships between the carbonate compressive strength and confining pressure, maximum shear stress and mean stress, and internal friction angle and unconfined compressive strength (UCS) are systematically investigated based on the compiled database. New correlations to predict the UCS and Young's modulus of each carbonate type have been developed from the petrophysical properties. Applying P90 as a threshold on the estimated minimum mud weight proved to be conservative. For fracture mud weight, the field data showed that the P50 threshold did not prevent fluid losses. This study contributes toward better methods to predict shear wave velocities exemplified with field cases in Southeast Iraq"--Abstract, page iv.