

SPE/AAPG/SEG Unconventional Resources Technology Conference (URTeC 2017)

Austin, Texas, USA
24-26 July 2017

Volume 1 of 5

ISBN: 978-1-5108-6496-2

Printed from e-media with permission by:

Curran Associates, Inc.
57 Morehouse Lane
Red Hook, NY 12571



Some format issues inherent in the e-media version may also appear in this print version.

Copyright© (2017) by Society of Petroleum Engineers
All rights reserved.

Printed by Curran Associates, Inc. (2018)

For permission requests, please contact Society of Petroleum Engineers
at the address below.

Society of Petroleum Engineers
P. O. Box 833836
Richardson, Texas 75083-3836

Phone: (800) 456-6863
Fax: (972) 952-9435

books@spe.org

Additional copies of this publication are available from:

Curran Associates, Inc.
57 Morehouse Lane
Red Hook, NY 12571 USA
Phone: 845-758-0400
Fax: 845-758-2633
Email: curran@proceedings.com
Web: www.proceedings.com

TABLE OF CONTENTS

VOLUME 1

3D Geomechanical Analysis of Refracturing of Horizontal Wells	1
<i>Dharmendra Kumar, Ahmad Ghassemi</i>	
3D Reservoir Characterization and Integrated Completion Optimization for Understanding Horizontal Well Spacing, Frac Staging, and Well Performance in the Niobrara Formation, DJ Basin	15
<i>Meagan Stephens, Jack Wiener, Muthukumarappan Ramurthy, Pat Kundert, John-Bosco Tran</i>	
Accurate Estimation of Tubular Fluid Flow Friction Loss During Liquid-supercritical CO₂ Fracturing and Transportation	23
<i>Xiaojiang Li, Gensheng Li, Kamy Sepehrmoori, Wei Yu, Haizhu Wang, Qingling Liu, Hongyuan Zhang, Zhiming Chen</i>	
Advances in Simulation of Hydrocarbon Production From Shale Reservoirs	40
<i>Masoud Alfi, Zhi Chai, Bicheng Yan, Brian C. Stimpson, Maria A. Barrufet, John Killough</i>	
Alkenes Detection From Drill Bit Metamorphism and Real-Time Geochemical Elemental Analysis on Drill Cuttings Aids Drilling Optimization and Geo-steering in Tight Unconventional Laterals	56
<i>Ettore Carcione, Isaac Easow, Barzin Chiniwala</i>	
Analysis of Artificially Matured Shales With Confocal Laser Scanning Raman Microscopy: Applications to Organic Matter Characterization	62
<i>Grant A. Myers, Kelsey Kehoe, Paul Hackley</i>	
Application of Anisotropic Depth Imaging Onshore	78
<i>Scott Sutherland, Marianne Rauch-Davies</i>	
Application of Data Analytics for Production Optimization in Unconventional Reservoirs: A Critical Review	82
<i>Srikanta Mishra, Luan Lin</i>	
Application of Fiber-optic Temperature Data Analysis in Hydraulic Fracturing Evaluation: A Case Study in Marcellus Shale	88
<i>Shohreh Amini, Payam Kavousi, Timothy R. Carr</i>	
Application of Integrated Core and 3D Image Rock Physics To Characterize Niobrara Chalk Properties Including Relative Permeability With Bound Water Effect	99
<i>Alan P. Byrnes, Shawn Zhang, Lyn Canter, Mark D. Sonnenfeld</i>	
Application of Microseismic to Assess Hydraulic Fracture Behavior in Relation to Completion Design and Landing Zone	119
<i>Stacy Trowbridge, Joe Wicker, James Courtier, Ryan Fairfield, Tammy Campbell</i>	
Application of Multi-segment Well Modeling to Simulate Well Interference	130
<i>Hewei Tang, Zhi Chai, Bicheng Yan, John Killough</i>	
Application of Organic Geochemistry on Assessment of Fluid Behavior and Oil Migration within the Woodford Shale in the Anadarko Basin	141
<i>Mohammad W. Rahman, Dwain Veach, Ram Jayakumar, Soodabeh Esmaili</i>	
Application of Statistical Methods to Predict Production From Liquid-Rich Shale Reservoirs	153
<i>Peng Zhou, Huiyan Sang, Liuyi Jin, W. John Lee</i>	
Applications and Limitations of Inorganic Geochemical-Chemostratigraphic Records From the Devonian Three Forks Formation, North Dakota, USA	172
<i>Harry Rowe, Evan Sivil, Austin Morrell, Pukar Mainali, Gerry Torrez, Amanda Musgrove, Jarred Garza</i>	
Applications of Nuclear Magnetic Resonance (NMR) Logs in Shale Gas Reservoirs for Pore Size Distribution Evaluation	179
<i>Hongyan Yu, Zhenliang Wang, Reza Rezaee, Yang Su, Wei Tan, Yujie Yuan, Yihuai Zhang, Liang Xiao, Xi Liu</i>	
Applying HC Fingerprinting Technology to Determine the Amount of Oil Produced from Hydraulically-Fractured Wolfcamp Reservoirs Using Petroleum Samples Extracted From Conventional Core Plugs	188
<i>Alan S. Kornacki, Joseph T. Westrich, Changrui Gong, Lucia Rodriguez, Jeff S. Etienne</i>	
Approximation of Multi-Fractured Horizontal Well Composite Reservoir Models Using Decline Curves	202
<i>David Fulford</i>	
Assessment of Producidle Fluid Quality From the Vaca Muerta Unconventional Play (Neuquen Basin, Argentina)	217
<i>Rouven Elias, Nicolas Mottet, Olivier Ruau, Francois Gelin</i>	
Bakken Production Outlook Sensitivity and Uncertainty Analysis	224
<i>Svetlana Ikonnikova, Gurcan Gulen, John Browning</i>	

Basin-scale Static Models for Unconventional Resource Plays, Example From Wolfberry in Midland Basin	229
<i>Tad Gladczenko, Rachael Mays, James Hardt, Matt Houston</i>	
Best Practices in Designing and Executing a Comprehensive Hydraulic Fracturing Test Site in the Permian Basin	236
<i>James Courtier, Karen Chandler, Danny Gray, Shaun Martin, Randy Thomas, Joe Wicker, Jordan Ciezobka</i>	
Biogeochemical Characterization of Core, Fluids, and Gas at MSEEL Site	252
<i>Shikha Sharma, Timothy R. Carr, Paula J. Mouser, Kelly Wrighton, David Cole, Michael Wilkins, Thomas Darrah, Alexandra Hakala</i>	
Bridging the Gap Between Produced Water and Source Water: Modeling Water Management Economics to Identify Cost Saving Potential for Operators	260
<i>Tyler F. Hussey, David Burnett</i>	
Can Gas-Permeability of Fractured-Shale Be Determined Accurately by Testing of Core Plugs, Drill Cuttings, and Crushed Samples?	274
<i>Faruk Civan</i>	
Case History of DAS Fiber-Based Microseismic and Strain Data, Monitoring Horizontal Hydraulic Stimulations Using Various Tools to Highlight Physical Deformation Processes (Part A)	283
<i>Robert Hull, Robert Meek, Hector Bello, Douglas Miller</i>	
Ceramic Proppant Transport and Placement in Heterogeneous Fracture Systems	296
<i>Dhurgham Kadhim, Abdulmohsin Imqam, Shari Dunn-Norman</i>	
Characterization of Early-Time Performance of a Well with a Vertical Fracture Producing at Constant Pressure	314
<i>Nicholas E. Wiewiorowski, Alex Valdes-Perez, Thomas A. Blasingame</i>	
Characterization of Sub-Log Scale Variability in Mudstones and the Effects of Variable Sampling Scales on High Resolution Models; Examples From Bone Spring Formation, West Texas	337
<i>Austin Morrell, Santhosh Narasimhan, Harry Rowe, Pukar Mainali</i>	
Characterizing and Modeling Multi-Scale Natural Fractures in the Ordovician-Silurian Wufeng-Longmaxi Shale Formation in South Sichuan Basin	345
<i>Qin Jun, Chenggang Xian, Xing Liang, Chunduan Zhao, Gaocheng Wang, Lizhi Wang</i>	
Characterizing Connectivity of Multiscale Pore Structure in Unconventional Reservoirs by the Complex Network Theory	357
<i>Bin Zhao, Yanjun Shang, Lu Jin, Bao Jia</i>	
Characterizing Reservoir Behavior with Cluster-Based Microseismic Analysis	367
<i>Adam M. Baig, Ted Urbancic, Katie Bosman, Ellie Ardakani, John M. Thompson</i>	
Classification / Corroboration of Facies Architecture in the Eagle Ford Group: A Case Study in Thin Bed Resolution	379
<i>Patricia Santogrossi</i>	
Combining Petrophysical Properties and Ultrasonic Velocity for Improved Prediction of Tight Carbonate Reservoir	396
<i>Abdallah Abdelkarim, Osman Abdullatif</i>	
Combining Statistical Analysis With Simulation to Optimize Unconventional Completions - Upper and Lower Montney Formations, Canada	403
<i>Omar Q. Mohammed, Rashid Kassim, Larry K. Britt, Shari Dunn-Norman</i>	
A Comparative Study of the Effects of Clay Content on the Fracture Conductivity of the Eagle Ford Shale and Marcellus Shale Formations	418
<i>Jesse Guerra, Ding Zhu, A. Daniel Hill</i>	
Comparison of Micro- and Macro-Wettability Measurements for Unconventional Reservoirs: The Devil is in the Detail	435
<i>Hanford Deglint, Amin Ghanizadeh, Chris DeBuhr, Christopher Clarkson, James W. Wood</i>	
Completion Optimization While Drilling - Geomechanical Steering Towards Fracable Rock Using Corrected Mechanical Specific Energy	444
<i>A. Jacques, Ahmed Ouenes, Ron Dirksen, M. Paryani, Syed Rehman, Moussa Bari</i>	
Comprehensive Modeling of Nanopore Gas Storage and Transport Including Absorption, Adsorption, and Confinement Effects in Shale-Gas Reservoirs	463
<i>Faruk Civan</i>	
Constraints on Natural Fracture and In-situ Stress Trends of Unconventional Reservoirs in the Permian Basin, USA	484
<i>David Forand, Vincent Heesakkers, Kenneth Schwartz</i>	
Constructing Enhanced Type Wells Using Cluster-Weighted Modelling	503
<i>Nitinkumar L. Chaudhary, W. John Lee</i>	

Constructing High Resolution, Inch Scale Continuous Logs via a Multi Domain Approach to Improve Hydraulic Fracturing by Capturing Thin Beds in the Bone Spring Formation, Delaware Basin, Reeves County,.....	510
<i>Santhosh Narasimhan, Pukar Mainali, Harry Rowe, Austin Morrell, Wesley Ingram, Andy Benson, Nathan Ganser, Sean Arrington</i>	
Constructing Oil/Gas Capillary Pressure and Relative Permeability Curves From a Distribution of Pores in Shale Reservoirs.....	528
<i>Brian C. Stimpson, Maria A. Barrufet</i>	
Continental Production Allocation and Analysis Through Big Data.....	548
<i>Beau T. Rollins, Andy Broussard, Billy Cummins, Akim Smiley, Nelson Dobbs</i>	
Coupling Complex Resistivity, Geomechanical and Acoustic Properties and Permeability in Sandstone and Shale Reservoirs.....	556
<i>Daisuke Katsuki, Azra N. Tutuncu</i>	
DAS Microseismic Monitoring and Integration With Strain Measurements in Hydraulic Fracture Profiling.....	566
<i>Martin Karrenbach, Andrew Ridge, Steve Cole, Kevin Boone, Dan Kahn, Jamie Rich, Ken Silver, Dave Langton</i>	
Defining Linkages Between Chemofacies and Mechanical Stratigraphy in the Austin Chalk: Implications for Geomechanics and Induced Fracture Simulations.....	581
<i>Harry Rowe, Evan Sivil, Chris Hendrix, Santhosh Narasimhan, Andy Benson, Austin Morrell, Gerardo Torrez, Pukar Mainali</i>	
Delaware Basin Leonard Reservoir Characterization, New Mexico and Texas.....	589
<i>Sarah Rittenhouse, Yamin Li, Kate Hughston-Kennedy, Joanna Fritz, Jess Pritchard, Lauren Cassel, Valentina Baum, Sarah Liem, Tom Mooney</i>	
Delaware Basin: Seven Year Review of Activity and Performance.....	611
<i>Kurt M. Mire, James Moomaw</i>	
Depositional Environment and Impact on Pore Structure and Gas Storage Potential of Middle Devonian Organic Rich Shale, Northeastern West Virginia, Appalachian Basin.....	631
<i>Liaosha Song, Thomas Paronish, Vikas Agrawal, Brittany Hupp, Shikha Sharma, Timothy R. Carr</i>	
Detailed Oriented Seismic Processing Leads to More Accurate Elastic Attribute Results in the Delaware Basin.....	642
<i>Marianne Rauch-Davies, Steve Smith, Alyona Bashkirtseva Hall</i>	
Determination of Local Diffusion Coefficients and Directional Anisotropy in Shale From Dynamic Micro-CT Imaging.....	649
<i>Yulai Zhang, Peyman Mostaghimi, Andrew Fogdon, Alessio Arena, Adrian Sheppard, Jill Middleton, Ryan T. Armstrong</i>	
Determining Bedding Slip Planes With Microseismic Processing.....	662
<i>Natalia Verkhovtseva, Ben Bagherian, Timur Mukhtarov</i>	
Determining Quantity and Quality of Retained Oil in Mature Marly Chalk and Marlstone of the Cretaceous Niobrara Formation by Low-Temperature Hydrous Pyrolysis.....	672
<i>Michael D. Lewan, Mark Sonnenfeld</i>	
Determining the Optimal Artificial Lift Implementation Strategy in the Midland Basin.....	680
<i>Yogashri U. Pradhan, Hongjie Xiong, James Forrest, Tiejun Zhu, Amir Kianinejad, Alexander Cui, Sunhua Gao</i>	
Developing Predictive Models for Shale Reservoirs.....	696
<i>Stephen A. Holditch, Carlos A. Dengo</i>	
A Diagnostic Approach to Identify Complex Fracture Geometries in Unconventional Reservoirs Using a Semi-analytical Model.....	709
<i>Zhiming Chen, Xinwei Liao, Wei Yu, Kamy Sepehrnoori, Xiaoliang Zhao, Xiaojiang Li, He Sun</i>	
Different Flow Behaviors of Low-Pressure and High-Pressure CO₂ in Shales.....	736
<i>Bao Jia, Jyun-Syung Tsau, Reza Barati</i>	

VOLUME 2

Does Flowing Pressure Matter? A Statistical Study.....	754
<i>Dylan Loughheed, Reza Khaksarfard, David Anderson</i>	
Dynamic Flow Behavior in Shales Described via Digital Rock Modeling Provides Insight into Gas Injection.....	769
<i>Richard M. MacDonald, Steve Isaac Geetan, Denis Klemm</i>	
Early Time SRV Characterization Through Flowback Analysis: Application of Clarkson/Williams-Kovacs Technique to Vaca Muerta.....	780
<i>Romain Cugnart, Sedera Rasoanaivo, J. D. Williams-Kovacs, Mariano Raverta, C. R. Clarkson</i>	

Effective Constraint of RTA Models Utilizing Microseismicity Derived Flow Attributes	793
<i>Ted Urbancic, Adam Baig, Gisela Viegas, John M. Thompson, David Anderson, Craig Rice, Lucas Martin</i>	
Effective Utilization of Field Water Resources and Optimization of Water Cycle in Reservoir Operations and Petroleum Production by Proper Characterization and Processing	809
<i>Faruk Civan</i>	
Effects of Cyclic Fracturing on Acoustic Events and Breakdown Pressure	822
<i>Abhishek Agrawal, Ahmad Sakhaee-Pour</i>	
Efficient, Low-Risk, Comprehensive Geological Characterization of Lateral Wells to Optimize Completion Performance	832
<i>Dean Fratarcangeli, Tammy Alcorn, Patrick McBride, Andy Wray, Elia Haddad, Robert Laronga, Nasar Khan</i>	
Efficient Stress Characterization for Real-Time Drawdown Management	844
<i>Kurt Wilson, R. R. Hanna Alla</i>	
EIA's Monthly Coverage of Oil and Natural Gas Production Improves Energy Forecasts for the United States	859
<i>Olga Popova, Gary Long, Jeffrey Little, Barbara Mariner-Volpe, Steven Grape</i>	
Estimating Oil-Water Relative Permeability Curves Using Digital Rock Physics	867
<i>Christopher J. Landry, Masa Prodanovic, Robert M. Reed, Peter Eichhubl, Kishore Mohanty</i>	
EUR Assessment of Unconventional Assets Using Machine Learning and Distributed Computing Techniques	888
<i>Zhenyu Guo, Chaohui Chen, Guohua Gao, Richard Cao, Ruijian Li, Chunlei Liu</i>	
Evaluating Hydrocarbon-in-Place and Recovery Factor in a Hybrid Petroleum System: Case of Bakken and Three Forks in North Dakota	905
<i>S. Amin Gherabati, John Browning, Frank Male, Scott Hamlin, Katie Smye, Mark Walsh, Svetlana A. Ikonnikova, Guinevere McDaid, Casee Lemons</i>	
Evaluating the Shublik Formation as an Unconventional Resource Play on the Alaska North Slope	920
<i>Allegra Hosford Scheirer, Leslie B. Magoon, Kenneth J. Bird, Edward A. Duncan</i>	
The Evolution of the Montney Completion Design: Completion-Driven Well Performance Compared to Lower 48 Plays	927
<i>Morgan A. Kwan</i>	
Expandable Diverting Agents to Improve Efficiency of Refracturing Treatments	932
<i>Livio Santos, Arash Dahi Taleghani, Guoqiang Li</i>	
Experimental Measurement of Fracture Permeability at Reservoir Conditions in Utica and Marcellus Shale	941
<i>Luke P. Frash, James W. Carey</i>	
An Experimental Method to Study the Impact of Fracturing Fluids on Fracture Conductivity in Heterogeneous Shales	950
<i>Weiwei Wu, Rodney Russell, Mukul Sharma</i>	
Extraction of Oil From the Bakken Shales With Supercritical CO₂	964
<i>Lu Jin, Steven Hawthorne, James Sorensen, Lawrence Pekot, Bethany Kurz, Steven Smith, Loreal Heebink, Nicholas Bosshart, Jose Torres, Chantsalmaa Dalkhaa, Charles Gorecki, Edward Steadman, John Harju</i>	
Facies Control on the Prospectivity of the Unconventional Mowry Formation, Southern Powder River Basin, Wyoming, USA	981
<i>Simon Purvis, Christopher Iwobi, Ronald Kenny, James P. Fenton, Vishnu Pandey, Ceri Davies</i>	
Facies Reconstruction through Core and Borehole Image Log Integration in the Bone Spring Formation, Delaware Basin, West Texas	987
<i>Aidan Blount, Tyler Croft, Brian Driskill, Long Ma, Valentina Vallega, Elia Haddad</i>	
Fast and Reliable Estimates of Low Permeabilities by the Full-Immersion Pressure-Pulse Decay	1002
<i>Michael J. Hannon</i>	
A Fast Semi-Analytical Method for Refracturing Candidate Selection and Performance Estimation of Shale Wells	1022
<i>Chigozie Aniemen, Iman Oraki Kohshour</i>	
Fault Detection From 3D Seismic Data and Distribution of Conjugate Faults in the Bakken Formation	1042
<i>Ismot Jahan, John Castagna, Michael Murphy</i>	
Field Application of a Real-Time Well-Site Drilling Advisory System in the Permian Basin	1051
<i>D. Sanderson, G. S. Payette, B. J. Spivey, J. R. Bailey, M. Calvo, R. Kong, A. Eddy</i>	
Finding the Nugget of Truth: Using Quantile Regression With Production Data for Comparison to Geological Controls and Completion Efficiency	1063
<i>Alan Lindsey, Keith Robertson</i>	
Flow Behavior Analysis of Multi-Well Communication Through Secondary Fractures in Tight Oil Reservoirs Using a Laplace Domain Hybrid Model: A Field Example From the Western Canadian Sedimentary Basin	1071
<i>Pin Jia, Linsong Cheng, Christopher Clarkson, J.D. Williams-Kovacs</i>	

Flow Dynamics and Pore Scale Physics in Unconventional Shale Reservoirs	1090
<i>Najeeb S. Alharthy, Tadesse Weldu Teklu, Sherif Abd El-Gawad, Hossein Kazemi, Ramona Graves</i>	
Flow Interference Between Frac Clusters (Part 2): Field Example From the Midland Basin (Wolfcamp Formation, Spraberry Trend Field) With Implications for Hydraulic Fracture Design	1111
<i>Ruud Weijermars, Arnaud van Harmelen, Lihua Zuo</i>	
Flow Simulation of Complex Fracture Systems With Unstructured Grids Using the Fast Marching Method	1127
<i>Changdong Yang, Xu Xue, Michael J. King, Akhil Datta-Gupta</i>	
Forecasting Production from Bakken and Three Forks Wells Using a Segregated Flow Model	1145
<i>Frank Male, Amin Gherabati, John Browning, Michael Marder, Svetlana Ikonnikova</i>	
Fracture Hit Monitoring and Its Mitigation Through Integrated 3D Modeling in the Wolfcamp Stacked Pay in the Midland Basin	1156
<i>Baosheng Liang, Shahzad Khan, Yula Tang</i>	
Fracture Likelihood Analysis Using Seismic and Triple Combo Log Data in the Stacked-Carbonate Play of Madison County	1172
<i>Courtney Beck, Anna Khadeeva, Bhaskar Sarmah, Andrew Whitsett, Trey Kimbell</i>	
A Fracture-Based Approach for Modeling Production in Stress-Sensitive Coals, Surat Basin, Australia	1185
<i>Seth Buseti, Sameer Ganpule, Julio Sabogal Polania, Pedro Paris</i>	
Gas Permeability Evolution During Production in the Marcellus and Eagle Ford Shales: Coupling Diffusion/Slip-flow, Geomechanics, and Adsorption/Desorption	1199
<i>Bao Jia, Dandan Li, Jyun-Syung Tsau, Reza Barati</i>	
Gas Slippage in Tight Rocks With Sub-irreducible Water Saturation	1211
<i>Jing Li, Pin Jia, Kelu Wu, Xiangzeng Wang, Shiyuan Qu, Juntai Shi, Tianhao Jiang, Yifu Dong</i>	
Generate Type Well Performance Curves by Combining Multi-Segment Decline Models and Calibrated Numerical Simulation Models for UR Wells in Permian Basin	1232
<i>Hongjie Xiong, Sunhua Gao, Hanyu Li</i>	
Geology and Petrophysics of the Bakken Unconventional Petroleum System	1248
<i>H. Scott Hamlin, Katie Smye, Robin Dommissie, Ray Eastwood, Casee R. Lemons, Guinevere McDaid</i>	
Geomechanical Facies Model for Wolfcamp Formation (Midland Basin)	1262
<i>Valeri Shelokov, Mriganko Sarkar, Ray Wydrinski</i>	
Geomechanical Investigation of Microseismic Mechanisms Associated With Slip on Bed Parallel Fractures	1269
<i>Robert Hull, Paul Leonard, Shawn Maxwell</i>	
Geomechanical Modeling of Time-Dependent Strain in the Bakken and Implications of Stress Shadow Interactions Between Hydraulic Fractures	1280
<i>Neil A. Peterson, Michael Mehle, Yamina Aimene</i>	
Geomechanics of the Microseismic Response in Devonian Organic Shales at the Marcellus Shale Energy and Environment Laboratory (MSEEL) Site, West Virginia	1300
<i>Erich V. Zorn, William Harbert, Richard Hammack, Abhash Kumar</i>	
GIS-based Interpretation of Rock, Oil, Gas and PVT Data to Predict New Well Outcomes - Virtual Well Examples From the Eagle Ford and Second White Speckled Shale Formations of North America	1309
<i>John B. Curtis, Stephen W. Brown, John E. Zumberge, Kevin A. Ferworn, Matthew M. White</i>	
High Resolution Seismic Data Derived From Prestack Inversion and Machine Learning to Accurately Position Horizontal Wells in the Midland Basin, Texas	1317
<i>Robert Meek, Buzz Davis, Hector Bello</i>	
High-Resolution Visualization of Flow Interference Between Frac Clusters (Part 1): Model Verification and Basic Cases	1323
<i>Ruud Weijermars, Arnaud van Harmelen, Lihua Zuo, Ibere Alves Nascentes, Wei Yu</i>	
Horizontal Cased Hole Evaluation Using a New Pulsed Neutron Spectroscopy Tool and Dipole Sonic	1349
<i>Richard Reischman, Edgar Velez, Aaron Green, Brian Reynolds, Damian Yasin, Blaine Spies</i>	
How Diagnostic Fracture Injection Tests (DFITs) Show Horizontal Plane Tensile and Shear Fractures in Various Stress Settings	1362
<i>A. Kirby Nicholson, Robert C. Bachman, Robert V. Hawkes</i>	
Hydraulic Fracture Conductivity as a Function of Proppant Concentration Under Various Effective Stresses: From Partial Monolayer to Multilayer Proppants	1383
<i>Ming Fan, Yanhui Han, James McClure, Cheng Chen</i>	
Hydraulic Fracture Diagnostics and Stress Interference Analysis by Water Hammer Signatures in Multi-Stage Pumping Data	1399
<i>Jongsoo Hwang, Matthew J. Szabian, Mukul Sharma</i>	
Hydraulic Fracturing Fluid Effect on Clay Swelling in Stimulated Naturally Fractured Reservoirs	1411
<i>Mahdi Haddad, Alireza Sanaei, Kamy Sepehrnoori</i>	

Hydrocarbon Storage Mechanism in Shale Reservoirs and Impact on Hydrocarbon Production	1426
<i>Ali Tinni, Carl H. Sondergeld, Chandra S. Rai</i>	
Hyperspectral Imaging: Geological and Petrophysical Applications to Reservoir Characterization	1434
<i>Tobi Kosanke, Jason Chen</i>	
Identification of Potential Lacustrine Stratigraphic Intervals in the Woodford Shale, Oklahoma, Using Multi-Attribute 3-D Seismic Displays and a Supervised Neural Network	1440
<i>Emilio J. Torres, Roger M. Slatt, Kurt J. Marfurt, Lennon E. Infante, Luis A. Castillo</i>	
If It's So Easy, Why Don't You Come Do It Yourself? A Response to "What I Wish My Geologist Knew About Drilling: A Drilling Engineer's View of Geosteering"	1453
<i>Raymond Woodward, Sam Noynaert</i>	
Imaging Three-Dimensional Hydraulic Fractures in Horizontal Wells Using Functionally-Graded Electromagnetic Contrasting Propants	1475
<i>Xu Zhou, Arash Dahi Taleghani, J. W. Choi</i>	
Impact of Anisotropy Induced by Shale Lamination and Natural Fractures on Drilling, Completion, and Fracturing Design	1483
<i>Ming Gu</i>	

VOLUME 3

Impact of Re-Fracturing Techniques on Reserves: A Barnett Shale Example	1498
<i>Jared Brady, Johan A. Daal, Kevan Marsh, Trevor Stokes, Pavan Vajjha, Rusty Werline, Chris Williams</i>	
Impact of Well Spacing and Interference on Production Performance in Unconventional Reservoirs, Permian Basin	1506
<i>Foluke O. Ajisafe, Irina Solovyeva, Adrian Morales, Efe Ejofodomi, Matteo Marongiu Porcu</i>	
Improved Shale Characterization Through Joint Elastic-Electrical Effective Medium Modeling	1522
<i>Kelvin Amalokwu, Kyle Spikes, Kevin Wolf</i>	
Improving Well Designs and Completion Strategies Utilizing Multivariate Analysis	1530
<i>Joe Wicker, James Courtier, Danny Gray, Travis Jeffers, Stacy Trowbridge</i>	
Increasing Hydrocarbon Recovery From Shale Reservoirs Through Ballooned Hydraulic Fracturing	1538
<i>Ahmed Algarhy, Mohamed Soliman, Lloyd Heinze, Sheldon Gorell, Steven Henderson, Hisham Nasr-El-Din</i>	
Indirect Estimation of Fluid Transport and Rock Mechanical Properties from Elemental Compositions: Implications for "Sweet Spot" Identification in the Montney Formation (Canada)	1551
<i>Amin Ghanizadeh, B. Rashidi, Christopher Clarkson, Atena Vahedian, Cassandra P. Vocke, A.R. Ghanizadeh</i>	
Influence of Stratigraphy on Barriers to Fracture Growth and Completion Optimization in the Meramec Stack Play, Anadarko Basin, Oklahoma	1570
<i>Buddy Price, Kyle Haustveit, Alex Lamb</i>	
Inorganic Geochemical Characteristics of Lithofacies and Their Linkages to the Mechanical Stratigraphy of Uppermost Wolfcamp and Lower Bone Spring Formations, Delaware Basin, Texas	1578
<i>Harry Rowe, Austin Morrell, Michael Nieto, Seay Nance, Santhosh Narasimhan, Pukar Mainali, Nathan Ganser, Jarred Garza, John Grillo</i>	
Insights from the Marcellus Shale Energy and Environment Laboratory (MSEEL)	1586
<i>Timothy R. Carr, Thomas Wilson, Payam Kavousi, Shohreh Amini, Shikha Sharma, Jay Hewitt, Ian Costello, BJ Carney, Emily Jordon, Malcolm Yates, Keith MacPhail, Natalie Uschner, Mandy Thomas, Josiah Akin, Oluwaseun Magbagbeola, Adrian Morales, Asbjorn Johansen, Leah Hogarth, Olatunbosun Anifowoshe, Kashif Naseem, Richard Hammack, Abhash Kumar, Erich V. Zorn, Robert Vagnetti, Dustin Crandall</i>	
Intact and Shear Reactivation Strength of Eagle Ford and Woodford Shales From Multistage Triaxial Testing	1600
<i>Tito Heno, Carl H. Sondergeld, Chandra S. Rai</i>	
An Integrated Approach to Development of an Unconventional Play: Geosteering Operations in the Wolfcamp of the Southern Delaware Basin	1610
<i>Jennifer Hernandez, J. Alexandra Sloan, John Terwilliger</i>	
Integrated Evaluation of Roseneath-Epsilon-Murteree Formations, Cooper Basin, Australia to Develop an Optimal Approach for Sweet Spot Determination	1616
<i>Alexander Klokov, Alexander Repnik, Vitaliy Bochkarev, Anatoly Bochkarev</i>	
Integrated Modeling to Improve Well Performance in the Avalon Shale	1626
<i>Kurt Wilson, Eduardo Martinez, Meilin Du, Pablo Paez</i>	
Integrated Multi-Scale Reservoir Characterization: Wolfcamp Formation - Midland Basin	1642
<i>Joel Walls, Mark Ver Hoeve, Anyela Morcote, Michael Foster</i>	

An Integrated Study of Geophysical, Petrophysical, and Geochemical Data to Define Optimal Reservoir Development of the Avalon Shale in the Salado Draw Field, Delaware Basin, Lea County, New Mexico	1653
<i>Megan Swenberg, Kenneth Schwartz, Meghan Hoffnagle, Miguel Merino, Patrick Taha, Don Sherlock, John Best</i>	
Integrating Microseismic and Geomechanics to Interpret Hydraulic Fracture Growth	1659
<i>Dan Kahn, Jon Roberts, Jamie Rich</i>	
Integrating Mineralogy, Process Sedimentology and Geomechanics for Development of a Mechanical Stratigraphy Model of the Bakken Formation	1666
<i>Alyssa Charsky, David Pyles, Steve Sonnenberg</i>	
Integration and Comparison of Multi-Scale Digital Rock Analysis with Bulk Rock Porosity and LECO TOC within Multiple Appalachian Basin Formations	1683
<i>Joel Walls, Gabriela Davalos, Matthew Weinreich</i>	
Integration and Impact of Varying Open Hole Wireline Nuclear Magnetic Resonance Acquisition Parameters and Quantification; A Case Study in the Wolfcamp Formation, Delaware Basin	1691
<i>Stephanie Perry</i>	
Integration of Core Data, Digital Rock Analysis, Magnetic Resonance, and Well Logs for Improved Unconventional Resource Characterization	1702
<i>Stephanie Perry, Joel Walls, Tiffany Rider</i>	
Integration of Large-Area SEM Imaging and Automated Mineralogy-Petrography Data for Justified Decision on Nano-Scale Pore-Space Characterization Sites, as a Part of Multiscale Digital Rock Modeling Wo...	1715
<i>Andrey Kazak, Svyatoslav Chugunov, Victor Nachev, Mikhail Spasemykh, Anatolii Chashkov, Eugenij Pichkur, Mikhail Presniakov, Alexander Vasiliev</i>	
Interrogating Flowback Chemistry for Damage Markers in the Eagle Ford	1732
<i>Jesse Farrell, Ryan Williams, Rasika Prabhu, Sergey Makarychev-Mikhailov, William Kreimeier</i>	
Introduction to Poroelastic Response Monitoring - Quantifying Hydraulic Fracture Geometry and SRV Permeability from Offset-Well Pressure Data	1742
<i>Nicolas P. Roussel, Samarth Agrawal</i>	
Investigating Microstructural Heterogeneity in Organic Shale via Large-Scale, High-Resolution SEM Imaging	1755
<i>Hung T. Tran, Jeremy Jernigen, Mark E. Curtis, Carl H. Sondergeld, Chandra S. Rai</i>	
Investigating the Impact of Wellbore Liquid Drop-outs on Recoverable Reserves in Utica	1767
<i>Olusegun Osadiya, Nurlan Seilov, Jacques Danquigny, David Foulon, Mariano F. Raverta</i>	
Investigating the Organic Matter in Shales From the Canning and Perth Basins via Infrared and Raman Spectroscopy	1778
<i>Bobby Pejic, Julien Bourdet, Claudio Delle Piane, Zhongsheng Li, Charles Heath, M. Ben Clennell</i>	
Investigating Well Interference in a Multi-Well Pad by Combined Flowback and Tracer Analysis	1786
<i>Yingkun Fu, Hassam Dehghanpour, Obinna Ezulike, Claudio Virues, Doug Bearinger</i>	
Investigation of Production-Induced Stress Changes for Infill Well Stimulation in Eagle Ford Shale	1799
<i>Xuyang Guo, Kan Wu, John Killough</i>	
Key Performance Drivers in Shale/Tight Reservoirs: A Workflow for Proper Data Normalization	1819
<i>Soodabeh Esmaili, Bruce Escovedo, Tyler Conner, Ravi Vaidya, Richard Hand, Ram Jayakumar</i>	
Keys to Niobrara and Codell Production, East Pony/Redtail Area, Denver Basin, Colorado	1830
<i>Steve Sonnenberg</i>	
Laboratory Investigation of Fluid Flow and Permeability Evolution Through Shale Fractures	1844
<i>Zhi Ye, Michael Janis, Ahmad Ghassemi, Spencer Riley</i>	
Laboratory Investigation of Proppant-Pack Conductivity: Eagle Ford and Vaca Muerta Shale	1859
<i>Abhinav Mittal, Chandra S. Rai, Carl H. Sondergeld</i>	
Laboratory-Scale Studies on Chemical Reactions Between Fracturing Fluid and Shale Core From the Marcellus Shale Energy and Environmental Laboratory (MSEEL) Site	1877
<i>J. Alexandra Hakala, Dustin Crandall, Johnathan Moore, Thai Phan, Shikha Sharma, Christina Lopano</i>	
Lessons Learned From the Vaca Muerta: An Exploration Model to Aid Sweet-Spot Prediction in the Frontier Hanifa Unconventional Resource Play in the Middle East	1887
<i>Alex D. Bromhead, Owen Sutcliffe, Duncan Hay, Kate Evans</i>	
Lithology-Controlled Stress Variations: A Case Study of the Woodford Shale, Oklahoma	1902
<i>Xiaodong Ma, Mark Zoback</i>	
Mapping Unconventional Reservoir Stress Conditions: An Integrated Workflow Using Geological, Stimulation and Microseismic Data	1907
<i>Orlando J. Teran</i>	

The Marcellus Shale Energy and Environmental Laboratory (MSEEL): Water and Solid Waste Findings - Year One	1912
<i>P. F. Ziemkiewicz</i>	
Mechanical Index Testing of Unconventional Resource Core	1921
<i>Andrew P. Rathbun, Russell T. Ewy</i>	
Methods for Reconstructing Subsurface Pressure Regimes in an Unconventional Play as an Indicator of Well Performance in the Delaware Basin	1929
<i>Evan Kelly, Matt Laughland, Mriganko Sarkar, Donny Loughry</i>	
Microseismic Response and Geomechanical Principles of Short Interval Re-injection (SIR) Treatments	1935
<i>Alana Kent, David W. Eaton, Shawn Maxwell</i>	
Microseismic Without Dots - Probabilistic Interpretation and Integration of Microseismic Surveys	1944
<i>Ulrich Zimmer</i>	
Microstructures and Geochemical Characteristics of Bakken Shale Formations	1953
<i>Kouqi Liu, Mehdi Ostadhassan, Thomas Gentzis, Humberto Carvajal-Ortiz, Bailey Bubach</i>	
Midland Basin Wolfcamp Shale: Completions Observations and Lateral Length Optimization	1965
<i>Kyle Richter</i>	
Mineralogical and Physical Changes that Control Pore-Scale Shale-Gas Properties	1978
<i>Adam D. Jew, Anna L. Harrison, Andrew M. Kiss, Megan K. Dustin, Claresta Joe-Wong, Dana L. Thomas, Katharine Maher, Gordon E. Jr. Brown, David Cercone, John Bargar</i>	
Mitigating Shale Gas Developments Carbon Footprint: Evaluating and Implementing Solutions in Argentina	1985
<i>Christiane Eygun, Jed Belgaroui, Yang Wu, Fabian Pazos</i>	
Mixed Reservoir Wetting in Unconventional Reservoirs and Interpretation of Porosity/Resistivity Cross Plots, Derived From Triple-Combo Log Data	1999
<i>Michael Holmes, Antony M. Holmes, Dominic I. Holmes</i>	
Modeling and Simulation of Mass Transfer and Equilibrium in Tight Oil Formations	2019
<i>Marjan Sherafati, Kristian Jessen</i>	
Modeling Dynamic Behaviors of Complex Fractures in Conventional Reservoir Simulators	2033
<i>Yifei Xu, Wei Yu, Kamy Sepehrnoori</i>	
Modeling Multi-Fractured Horizontal Well Completions; A Case For Planar Hydraulic Fractures	2058
<i>Robert Shelley, Brian Davidson, Koras Shah</i>	
Modeling Well Interference and Optimal Well Spacing in Unconventional Reservoirs Using the Fast Marching Method	2065
<i>Jixiang Huang, Feyisayo Olalotiti-Lawal, Michael J. King, Akhil Datta-Gupta</i>	
Modifications for Fracture Damage and Changing Pressure Drawdown to Improve Accuracy of Duong Decline Model	2086
<i>Himanshu S. Jha, W. John Lee</i>	
Monitoring Hydraulic Fracturing Fluid Movement using Ground-Based Electromagnetics, with Applications to the Anadarko Basin and the Delaware Basin / NW Shelf	2115
<i>Mark S. Hickey, Santiago III Trevino, Mark E. Everett</i>	
Monitoring in a Western Canadian Shale Play With a Sparse Surface Network: Moment Tensor Analysis Implications	2127
<i>Kit Chambers, Bogdan Batlai, Brad Bialowas, John Nieto, Dario Baturan</i>	
Multi-Disciplinary Approach for a Landing Point Criteria in Vaca Muerta Formation	2137
<i>Ivan Lanusse Noguera, Manuel Fantin, Pablo A. Crespo, Luisa Crousse, Hernan Reijenstein, Raul Varela, Andres Bonelli, Fidel Morales</i>	
Multiphase Flow Simulation of Horizontal Well Artificial Lift and Life-of-Well Field Case Histories: HEAL System Modeled in PipeFractionalFlow	2155
<i>Anand Nagoo, Jeff Saponja, Trystan Wall, Kevin Eike, Mukul Sharma</i>	
Multiscale Characterization of Spatial Heterogeneity of Petroleum Source Rocks via Near-Infrared Spectroscopy	2168
<i>Yashar Mehmani, Alan K. Burnham, Michael D. Vanden Berg, Hamdi A. Tchelepi</i>	
Multiscale Seismic Models of Complex Fracture Networks	2173
<i>Richard L. Gibson, Yalchin Efendiev, Judith Chester, Yongchae Cho, Edith Sotelo Gamboa</i>	
A New Approach to Geosteering in Emerging Unconventional Plays	2189
<i>Peter Kowalchuk, Shiblee Hashem</i>	
A New Workflow for Improved Water Saturation Assessment in Organic-Rich Mudrocks Honoring Rock Fabric	2199
<i>Artur Posenato Garcia, Archana Jagadisan, Ameneh Rostami, Zoya Heidari</i>	
NMR at Different Temperatures to Evaluate Shales	2215
<i>Dragan Veselinovic, Derrick Green, Michael Dick</i>	

Non-Darcy Flow Regimes Coupled With Pore Compaction in Shale Gas Formations	2230
<i>Davud Davudov, Rouzbeh G. Moghanloo, Yuzheng Lan</i>	
A Novel Casing Antenna System for Crosswell Electromagnetic Telemetry in Pad Drilling	2250
<i>Shubin Zeng, Qiuzhao Dong, Jiefu Chen</i>	

VOLUME 4

Numerical Modeling of 1D Anomalous Diffusion in Unconventional Wells Using a NonUniform Mesh	2256
<i>Ralf Holy, Erdal Ozkan</i>	
Oil-Generation Kinetics for Oil-Prone Bakken Shales and Its Implication	2266
<i>Hui Jin, Michael D. Lewan, Stephen A. Sonnenberg</i>	
Optimization of Infill Well Development Using a Novel Far-Field Diversion Technique in the Eagle Ford Shale	2280
<i>Yuri Rodionov, Cyrille Defeu, Kush Gakhar, Kevin Mullen, J. T. Mayo, Dan Shan, Dmitriy Usoltsev, Efe Ejofodomi</i>	
Optimization of Surfactant Flooding in Tight Oil Reservoirs	2293
<i>Mohammad Lotfollahi, Mohammad Reza Beygi, Ali Abouie, Kamy Sepehrnoori, Mary Wheeler, David A. DiCarlo</i>	
Optimization of Unconventional Well-Pad Area Using Reservoir Simulation and Intelligent Sequential Sampling	2306
<i>Eric Robertson, Naresh Iyer, Robert Klenner, Guoxiang Liu</i>	
Optimizing Field Development Strategy Using Time-Lapse Geochemistry and Production Allocation in Eagle Ford	2318
<i>Jason Jweda, Eric Michael, Olufemi A. Jekanola, Robert Hofer, Victoria A. Parisi</i>	
Optimizing the Development of the Haynesville Shale - Lessons Learned from Well-to-Well Hydraulic Fracture Interference	2335
<i>Raul Esquivel, Thomas A. Blasingame</i>	
Optimizing Vertical and Lateral Spacing of Horizontal Wells in Permian Basin Stacked Bench Developments	2355
<i>Do Shin, Drew Popovich</i>	
An Organofacies-Based Mudstone Classification for Unconventional Tight Rock and Source Rock Plays	2373
<i>Art Donovan, Jonathan Evenick, Laura Banfield, Noel McInnis, William Hill</i>	
Overcoming the Impact of Reservoir Depletion to Achieve Effective Parent Well Refracturing	2388
<i>Ripudaman Manchanda, Mukul Sharma, Mehdi Rafiee, Lionel Ribeiro</i>	
Performance Based Reservoir Characterization in a Tight Gas Reservoir System - Case Study from Lajas and Punta Rosada Formations in the Neuquen Basin, Argentina	2402
<i>Lucia Lamberghini, Daniel Parra, Ezequiel Alonso, Federico Sorenson, Cristian Espina, Lucas E. Viglione, Daniel Clem, Dilhan Ilk</i>	
Permeability Estimation of a Middle-East Tight Gas Sand With NMR Data	2427
<i>Stacey M. Althaus, Jin-Hong Chen, Jilin Zhang, Fahd Almalki, Qiushi Sun, Ali Al-Shawaf</i>	
Perspectives on Emerging Domestic Unconventional Plays	2434
<i>Vello Kuuskraa, Taylor Malone, Brett Murray</i>	
Petroleum Geochemistry and Mudstone Diagenesis of the Woodford Shale, Anadarko Basin, USA - An Integrated Approach	2442
<i>Christopher D. Laughrey, Peter Purrazzella, Kultaransingh Hooghan</i>	
Petrophysical Characterization at the Extremes and Across Three Continents: Contrasting Examples From Utica, Marcellus, Longmaxi and Roseneath-Murteree Resource Shales	2454
<i>M. Ben Clennell, Matthew Josh, Lionel Esteban, Claudio Delle Piane, David Dewhurst, Vladimir Luzin</i>	
Petrophysical Properties of Shale From Different Source Rocks in the Middle East	2474
<i>Moustafa Dernaika, Joel Walls, Safouh Koronfol, Osama Al Jallad, Gary Sinclair</i>	
Pore-Scale Evaluation of Nuclear Magnetic Resonance Measurements in Organic-Rich Mudrocks Using Numerical Modeling	2491
<i>Saurabh Tandon, Zoya Heidari, Hugh Daigle</i>	
Predicting ESP Lifespan With Machine Learning	2506
<i>Jessamyn Sneed</i>	
Predicting Sweet Spots in Shale Plays by DNA Fingerprinting and Machine Learning	2513
<i>Chris Te Stroet, Jonathan Zwaan, Gerard de Jager, Roy Montijn, Frank Schuren</i>	
Prediction and Analysis of Geomechanical Properties of the Upper Bakken Shale Utilizing Artificial Intelligence and Data Mining	2525
<i>George K. Parapuram, Mehdi Mokhtari, Jalel Ben Hmida</i>	

Pressure and Rate Transient Analysis in Fracture Networks in Tight Reservoirs Using Characteristic Flow Volume	2544
<i>Jorge A. Acuna</i>	
Problems With Application of Material Balance Time to Transient Flow Data in Diagnostic Plots	2563
<i>Himanshu S. Jha, W. John Lee</i>	
Produced Water Microbial Control	2576
<i>Alan Shepstone, David Burnett, Keith McLeroy</i>	
Producing Gas-Oil Ratio Behavior of Unconventional Volatile-Oil Reservoirs, and Its Application in Production Diagnostics and Decline Curve Analysis	2583
<i>Mohammad Khoshghadam, Aaditya Khanal, C. Yu, Neda Rabinejadganji, W. J. Lee</i>	
Proppant Placement in Secondary Fractures	2600
<i>Songyang Tong, Kishore Mohanty</i>	
Prospect of Water Recycling Facility Requirements for Marcellus: Application of Data Analytics	2612
<i>Amin Etehadtavakkol, Ali Jamali</i>	
Protection Refrac: Analysis of Pore Pressure and Stress Change Due to Refracturing of Legacy Wells	2623
<i>Ali Rezaei, Mehdi Rafiee, Giorgio Bornia, Mohamed Soliman, Stephen Morse</i>	
Protocols and Common Pitfalls in Disposal Data Handling for Induced Seismicity Geomodels	2639
<i>Casee R. Lemons, Peter H. Hennings, Robin Dommissie, Jean-Philippe Nicot, Katie Smye</i>	
Quantification and Characterization of Hydrocarbon-Filled Porosity in Liquid-Rich Shales using Basic Programed Thermal Extraction and Pyrolysis, LECO-TOC, Archimedes Bulk Density, and Helium Pycnometr... ..	2649
<i>Kyle E. Gorynski, Mark Tobey, Daniel Enriquez, Thomas Smagala, J. Dreger, Richard Newhart</i>	
Quantification of Fracture-Matrix Fluid Transport in Unconventional Rocks Using Two-scale Microfluidic Chips	2661
<i>Ayaz Mehmani, Shaina Kelly, Carlos Torres-Verdin, Matthew Balhoff</i>	
Quantification of Recovery Factors in Downspaced Shale Wells: Application of a Fully Coupled Geomechanical EOS Compositional Simulator	2673
<i>Saurabh Sinha, Deepak Devegowda, Bhabesh Deka</i>	
Quantifying Organic Porosity and Predicting Estimated Ultimate Recovery (EUR) in the Eagle Ford Formation	2686
<i>Rich McLean, Carly Miller, Bryan Guzman, Joel Walls</i>	
Quantifying the Nano-Mechanical Signature of Shale Oil Formations by Nanoindentation	2702
<i>Kouqi Liu, Mehdi Ostadhassan, Chunxiao Li</i>	
Quantitative Real-Time DAS Analysis for Plug-and-Perf Completion Operation	2711
<i>Yijie Shen, Eric Holley, Mikko Jaaskelainen</i>	
Rapid Compositional Simulation and History Matching of Shale Oil Reservoirs Using the Fast Marching Method	2720
<i>Atsushi Iino, Aditya Vyas, Jixiang Huang, Akhil Datta-Gupta, Yusuke Fujita, Sathish Sankaran</i>	
Rapid Quantification of Mineralogy, Organic Matter, and Thermal Maturity of Cuttings with Diffuse Reflectance Infrared Fourier Transform Spectroscopy (DRIFTS): A Permian Basin Case Study	2741
<i>MaryEllen L. Loan, Michael M. Herron, Paul Craddock, Romain Prioul, Michael Prange, Kenneth M. Schwartz, Alyssa Charsky</i>	
Recommendations From Error Analysis of Single Well Microseismic Data With Full-Wavefield Moment Tensor Inversion: A Case Study	2753
<i>Juan M. Lorenzo, Trudy L. Watkins, Arash Dahi Taleghani</i>	
Refining Hydraulic Fracture Design in Tight Gas Reservoirs Using a New Generation of Slim Dipole Tools	2767
<i>Gabriel Gallardo Giozza, Jose R. Zambrano, Edgar Velez, Federico Sorenson, Lucia Lamberghini</i>	
Refracturing in the Eagle Ford Shale: One Operator's Quest to Identify and Rank Candidates, Minimize Well Interference, and Understand Variability of Results	2777
<i>Riley McFall, Kevin Mullen, Jason Baihly, Garrett Lindsay, Jung Shin</i>	
Reservoir and Completions Workflow Integration for Optimized Marcellus Field Development	2791
<i>Tim Budney, Jose E. Chirinos</i>	
Reservoir Productivity Index (RPI) From NMR Logs and the Analysis of Tight Oil Reservoirs	2797
<i>George B. Asquith</i>	
Resource Assessment in the Northern Midland Basin: Detailed Mapping of Late Pennsylvanian, Wolfcampian, and Early Leonardian Margins and Flooding Surfaces Using Well Logs and Seismic Data	2802
<i>Steven W. Sinclair, Luis Crespo, Lowell Waite, Kevin Smith, Caitlin Leslie</i>	
Resource Estimation of Eighty-Two European Shale Formations	2815
<i>Mart Zijp, Susanne Nelskamp, Niels Schovsbo, Lisbeth Tougaard, Andrei Bocin-Dumitriu</i>	

Rhenium-Osmium Geochronology and Geochemistry of the Permian Brushy Canyon Formation: Investigating the Controls of Re and Os Abundances in Organic-Rich Shales and the Evolution of Permian Seawater	2824
<i>Shawn Wright, Alan Brandon, John Casey</i>	
The Rise of the Machines, Analytics, and the Digital Oilfield: Artificial Intelligence in the Age of Machine Learning and Cognitive Analytics	2842
<i>Kathryn Ball, Tristan Arbus, Uchenna Odi, Jessamyn Sneed</i>	
Risks of Microseismic Fracture Mapping Mis-interpretation: Source-Dependent Sensitivity Induced by Surface Arrays Observational Bias	2851
<i>Pierre-Francois Roux</i>	
Rock Typing in Eagle Ford, Barnett, and Woodford Formations	2861
<i>Ishank Gupta, Chandra S. Rai, Carl H. Sondergeld, Deepak Devegowda</i>	
Role of Organic Acids in Controlling Mineral Scale Formation During Hydraulic Fracturing at the Marcellus Shale Energy and Environmental Laboratory (MSEEL) Site	2881
<i>J. Alexandra Hakala, Thai Phan, Mengling Stuckman, Harry Edenborn, Christina Lopano</i>	
The Role of Porosity in the Development of Parallel Bedded Calcite Filled Fractures (or Beef) in the Vaca Muerta: An Integrated Analysis From High Resolution Core Data	2887
<i>Alain Lejay, Salome Larmier, Philippine Rutman, Francois Gelin</i>	
Salt Precipitation in Ultra-Tight Hydrocarbon Reservoir Rocks: A Multi-Scale Experimental Study	2903
<i>Amir Hossein Alizadeh, Morteza Akbarabadi, Elizabeth Barsotti, Mohammad Piri, Neil Fishman, Nagi Nagarajan</i>	
Sampling a Stimulated Rock Volume: An Eagle Ford Example	2910
<i>Kevin T. Raterman, Helen E. Farrell, Oscar S. Mora, Aaron L. Janssen, Gustavo A. Gomez, Seth Buseti, Jamie McEwen, Michael Davidson, Kyle Frieauf, James Rutherford, Ray Reid, Ge Jin, Baishali Roy, Mark Warren</i>	
Seismic Monitoring of Hydraulic Fracturing Activity at the Marcellus Shale Energy and Environment Laboratory (MSEEL) Site, West Virginia	2928
<i>Abhash Kumar, Erich V. Zorn, Richard Hammack, William Harbert</i>	
Seismic Post-stack and Pre-stack Impedance Inversions in Depth, Examples From the Woodford Formation, Anadarko Basin	2941
<i>Marianne Rauch-Davies, Alex Lamb, Kara Rohan</i>	
An SEM Study of Porosity in the Organic-rich Lower Bakken Member and Pronghorn Member, Bakken Formation, Williston Basin	2946
<i>Jingqi Xu, Stephen A. Sonnenberg</i>	
Sequence Stratigraphic Architecture and Reservoir Characteristics of the Unconventional "Mississippian Limestone" Play, North-Central Oklahoma, USA	2959
<i>Zhanjing Gao, Yulun Wang</i>	
Shale Resource Assessment in Presence of Nanopore Confinement	2974
<i>I. Yucel Akkutlu, Seunghwan Baek, Olufemi M. Olorode, Pang Wei, Zhang Tongyi, Ai Shuang</i>	
Simultaneous Inversion for Microseismic Event Location and Velocity Model in Vaca Muerta Formation	2995
<i>Zhishuai Zhang, Jing Du, Fuchun Gao</i>	

VOLUME 5

A Single Core Test for Fracability, Breakdown Pressure and Fracture Conductivity	3015
<i>Zhengwen Zeng, Abdalah Harouaka</i>	
Slim, High Resolution Laterolog Array Tool: First Field Experiences	3029
<i>Jean-Marc Donadille, Igor Ilyin, Martin Luling, Tony Meszaros, Richard Reischman, Alexey Repnev, Vladimir Yukhlin, Nasar Khan, Mark Jones</i>	
Source Rock Reservoir Characterization Using Geology, Geochemical and Drilling Data	3042
<i>Robert Shelley, Amir Mohammad Nejad, Stanislav Sheludko</i>	
Spatial Continuity and Surveillance Recommendations in the Permian Basin Tight Rock Wolfcamp: Autocorrelation and Variogram Analysis for Determining Extent of Reservoir Homogeneity	3052
<i>Shane J. Prochnow, Hannah Luk, Matthew Jones, Michael Richey</i>	
STACKing It Up: An Economic and Geological Analysis of the STACK	3069
<i>Denise Yee, Gillian Johnston, Shakeeb Ahmed, David Howard</i>	
A Stochastic Permeability Model for Shale Formations Based on Embedded Discrete Fracture Model	3075
<i>Shiqian Xu, Qihong Feng, Sen Wang, Ming Zha, Ronghao Cui, Fangfang Gao, Yajuan Xu</i>	
Stochastic-based Coupling of Static and Dynamic Models: An Example From the Meremac Formation in the STACK Play	3095
<i>Mouin Almasoodi, Soodabeh Esmaili, Trevor Ingle</i>	

Stratigraphic Variability of the Demoinesian Marmaton Group Across the Lips Fault System in the Texas Panhandle Granite Wash, Southern Anadarko Basin	3114
<i>Patrick D. Jordan, Jesse J. Melick</i>	
Study on the Effect of Mineralogy and Organic Matter on Micromechanical Properties of Bakken Formation	3124
<i>Hao Fu, Hui Pu, Jun Ge, Xiaodong Hou</i>	
Subsurface Well Spacing Optimization in the Permian Basin	3132
<i>Baosheng Liang, Meilin Du, Christina Goloway, Robert Hammond, Pablo Paez Yanez, Tan Tran</i>	
Summary and Conclusions of Bakken and Three Forks Field Study	3144
<i>Svetlana Ikonnikova, Gurcan Gulen, John Browning</i>	
Surface to Subsurface Correlation of Eagle Ford Equivalent Strata From West to South Texas	3149
<i>Michael Pope, Matthew Wehner, Eric Peavey, Roy Conte, Mike Tice, Art Donovan</i>	
Tackling the Challenges of Acquiring Good Core Data From Tight Oil Reservoirs - An Example From the Bakken/Three Forks in North Dakota	3157
<i>Neil Fishman, Gary Simpson, Stephanie Hari-Roy</i>	
Tests of Fracture Water and Gas Permeability on Vaca Muerta Gas Shale	3169
<i>Kun Su, Jorge Torres, Yonatan Sanz Perl, Pierre Barlet, Atef Onaisi, Sandrine Vidal-Gilbert</i>	
Thermal Maturity Differences in Oils Produced From Lower Permian Wolfcamp A, B & C Laterals, Midland Basin	3178
<i>John Zumberge, Don Rocher, Jackie Reed</i>	
Thermodynamic Behavior of Liquid-Supercritical CO₂ Fracturing in Shale	3184
<i>Xiaojiang Li, Gensheng Li, Wei Yu, Haizhu Wang, Kamy Sepehrnoori, Zhiming Chen, He Sun, Shikun Zhang</i>	
Time-Lapse Geochemistry (TLG) Application in Unconventional Reservoir Development	3200
<i>Faye Liu, Eric Michael, Kyrre Johansen, David Brown, Jeffrey Allwardt</i>	
Time-Lapse Imaging of a Hydraulic Stimulation Using 4D Vertical Seismic Profiles and Fiber Optics in the Midland Basin (Part B)	3217
<i>Robert Meek, Kevin Woller, Mark George, Robert Hull, Hector Bello, Jed Wagner</i>	
Towards a Balance of Pore Size Distribution in Non-Conventional Hydrocarbon Reservoirs: a Combination of Bulk Techniques Applied to Comparable Sub-Samples Localized by 3D X-ray Tomography	3225
<i>N. Matskova, D. Pret, S. Gaboreau, P. Cosenza, R. Brechon, I. Gener, C. I. Fialips, G. Dubes, F. Gelin</i>	
Trade-offs and Implications of Two-stage Versus One-stage Unconventional Oil and Gas Exploration and Production Investment Strategies: A Case Study of the Barnett Play	3243
<i>Wonjae Jang, Svetlana Ikonnikova</i>	
Unconventional EOR: A Capillary Based Improved Oil Recovery Case Study for Shale Oil Scenarios in the Vaca Muerta Resource Play	3262
<i>Fernando R. Tuero, Marcelo Crotti, Ines Labayen</i>	
The Unconventional Play in the Neuquen Basin, Argentina - Insights From the Outcrop for the Subsurface	3277
<i>Gregor P. Eberli, Ralf Weger, Max Tenaglia, Laura Rueda, Leticia Rodriguez, Michael Zeller, Donald McNeill, Sean Murray, Peter Swart</i>	
Unconventional Reservoir Characterization Using Azimuthal Seismic Diffraction Imaging	3289
<i>Dmitrii Merzlikin, Sergey Fomel, Xinming Wu, Mason Phillips</i>	
Unconventional Reservoir Potential From Trapped Fluid Analysis Onshore Canning Basin, Australia	3299
<i>Sarah Feiner, Rachel Lishansky, Wipawon Phiukhao, Jiun-Chi Chao, Russell Moore, Don Hall, Carrie Kubacki</i>	
Understanding the 'Frac-Hits' Impact on a Midland Basin Tight-Oil Well Production	3316
<i>Hao Sun, Dengen Zhou, Adwait Chawathe, Baosheng Liang</i>	
Unique Multidisciplinary Approach to Model and Optimize Pad Refracturing in the Haynesville Shale	3327
<i>Tao Xu, Garrett Lindsay, Jason Baily, Raj Malpani, Efe Ejofodomi, Dan Shan</i>	
Use of In-Situ Fluid Heterogeneity Characterization and Flowback Fluid Compositions to Constrain Fracture Height Growth and EOR Modeling in Liquid-Rich Low-Permeability Reservoirs	3342
<i>Christopher Clarkon, S.M. Ghaderi, Mohammed Kanfar, B. Haghshenas, Sochi Iwuoha</i>	
The Use of Pump Down Pressure Responses to Diagnose Hydraulic Fracture Characteristics	3365
<i>Abigail Roark, George Waters, Nick Ashley</i>	
USGS Assessment of Water and Proppant Requirements and Water Production Associated With Undiscovered Petroleum in the Bakken and Three Forks Formations	3381
<i>Seth S. Haines, Brian Varela, Sarah Hawkins, Nicholas Gianoutsos, Marilyn Tennyson</i>	
Using a Systematic, Bayesian Approach to Unlock the True Value of Public Data; Midland Basin Study	3390
<i>Sean Clifford, Tim Torres</i>	

Using Data Analytics to Understand the Impact of Enhanced Completion Designs and Production Trends Within the Wattenberg Field, Denver-Julesburg Basin, Colorado	3403
<i>Aaron Reimchen, Dane Gregoris, Gibson Scott, Kristina Repchuk, Justin Lepore</i>	
Using Fracture Stress Shadows to Drive Stage Spacing	3411
<i>Jonathan P. McKenna, Michael Blaz, Michael Grealy, Orlando J. Teran</i>	
Using Seismic Inversion to Predict Geomechanical Well Behavior: A Case Study From the Permian Basin	3419
<i>Simon S. Payne, Jerry Meyer</i>	
Utilizing A Viscoplastic Stress Relaxation Model to Study Vertical Hydraulic Fracture Propagation in Permian Basin	3429
<i>Shaochuan Xu, Fatemeh Rassouli, Mark Zoback</i>	
The Value of Microseismic Monitoring and Interpretation of Microseismic Event Hypocenters - Myths, Misconceptions, Realities, and Opportunities	3434
<i>Erkan Ay, Nigel Payne, Joel Le Calvez, Herve Denaclara</i>	
Water Consumption and Proppant Transport Aspects of Foam Fracturing Fluids	3442
<i>James McAndrew, Pablo Cisternas, Antoine Pruvot, Xianhui Kong, Songyang Tong</i>	
Water Weakening: Case Study From Marcellus and Woodford	3450
<i>Ishank Gupta, Carl H. Sondergeld, Chandra S. Rai, Ronny Hofmann</i>	
Well Interference and Optimum Well Spacing for Wolfcamp Development at Permian Basin	3465
<i>Richard Cao, Ruijian Li, Alejandro Girardi, Nitin Chowdhury, Chaohui Chen</i>	
Well Productivity Analysis of the Bakken Shale Play	3476
<i>Emilian Vankov, Svetlana Ikonnikova, Gurcan Gulen, Kenneth Medlock</i>	
Well Spacing Optimization in Eagle Ford Shale: An Operator's Experience	3481
<i>Mehdi Rafiee, Tarun Grover</i>	
Well Test Workflow to Characterize Sustainable Water Sources for the Permian Basin Unconventional Development	3504
<i>Yula Tang, Baosheng Liang, Leif Larsen, Hannah Luk</i>	
Wellbore Integrity R&D: Ensuring Well Control and Zonal Isolation in Unconventional Resource Plays	3523
<i>Erica Folio, Olayinka Ogunsola, Elena Melchert</i>	
Wellsite Chemostratigraphy in the Petroleum Province of Anadarko Basin: How Thermal Pulses, Deposition and Diagenesis Influence Hydrocarbon Accumulation	3530
<i>Alessandro Pozzi, Isaac Easow, Mario Ruggiero</i>	
What Happens to Permeability at the Nanoscale? A Molecular Dynamics Simulation Study	3542
<i>Raul Velasco, Manas Pathak, Palash Panja, Milind Deo</i>	
Can Moment Tensor Inversion Aid Engineering Decisions? A Delaware Basin Case Study	3552
<i>Mark G. Mack, Scott M. Taylor, Jamie Rich, Dan Kahn, Jeremy King, Ben Schaeffer, Anton Reshetnikov, David Langton, Brendan Elliott, Alex Biholar</i>	
Catalytic Generation of Methane at 60 to 100 °C and 0.1 to 300 MPa From Source Rocks Containing Kerogen Types I, II, and III	3565
<i>Lin Wei, Arndt Schimmelmann, Maria Mastalerz</i>	
Determining Fracture Geometry in a Multifractured Horizontal Well Using DFIT Interpretation, Intra-well Fracture-To-Fracture Interference, and Production History Matching	3577
<i>David P. Craig</i>	
Impact of Solvent Extraction on Surface Area Measurements in Organic-Rich Shales using Nitrogen Adsorption	3589
<i>Ankita Sinha, Son Dang, Carl Sondergeld, Chandra Rai</i>	
The Influence of Sedimentation “Rate” and Depositional Processes on Organic-Richness of the Wolfcamp Formation, Midland Basin	3610
<i>Jason S. Mintz, Barbara Rich, Jens Koester, Jim Fenton, Ceri Davies, Jim Harris, Adriana Perez</i>	
Integrating AVO Analysis With Poststack Seismic Approaches to Better Understand Complex Faulting/Fracturing in the Niobrara Formation	3614
<i>James Applegate, W. Travis Brown, Doug Paul, Filip Soos</i>	
Inter-Scaled Digital Core Analysis: From Core to Pore and Back	3621
<i>Chi Vinh Ly, Jason Mintz, Aiguo Bian, Matthew Andrew, Sreenivas Bhattiprolu</i>	
Linear Post Linear Flow Production Analysis	3629
<i>Trent Bone, Deepak Devegowda, Jeffrey Callard</i>	
The Lower Montney Turbidite Complex of Northwest Alberta and Northeast British Columbia: Evolution of an Oil and Gas Play From Conventional to Unconventional	3637
<i>Richard Sereda, John Fur</i>	
Mapping the Natural Fracture Network in Utica Shale Using Artificial Intelligence (AI)	3646
<i>Shahab D. Mohaghegh</i>	

Petrophysical Characterization of the Bakken Shale for Carbon Storage Investigation	3668
<i>Circe Verba, Dustin Crandall, Johnathan Moore, Christina Lopano</i>	
The Plug Drum Effect, Or Why Your Microseismic Events May Not Be Where You Think They Are	3680
<i>Guillaume Bergery, Zhishuai Zhang, Jing Du, D. Diller, T. Shuck, B. Fish</i>	
Pore Pressure and Elastic Moduli Estimation Considerations for a Simplified Geomechanical Model for Unconventional Plays: A Case Study in the Vaca Muerta Formation	3690
<i>Sergio Cuervo, Ezequiel Lombardo</i>	
Pre-Development Research to Understand Stakeholder Perceptions of Energy Development in Environmentally Sensitive Areas	3702
<i>M. E. Higgins, D. B. Burnett, U. Kreuter, R. C. Haut</i>	
A Quantitative Application of Seismic Inversion and Multi-Attribute Analysis based on Rock Physics Linear Relationships to identify High Total Organic Carbon Shale - A Case Study from the Perth Basin,...	3715
<i>Y. Altowairqi, R. Rezaee, B. Evans, M. Urosevic</i>	
Shale Activity Test and Shale Reservoir, Shale Seal and Well Stability Properties Characterization	3720
<i>Konstandinos Zamfes</i>	
Timely Understanding of Unconventional Reserves through Rate Transient Analysis - A Vaca Muerta Case Study	3734
<i>John M. Thompson, David M. Anderson, Daniel Nakaska, Matias Fernandez Badessich, Cameron T. Boulton</i>	
The Use of Time-Lapse Seismic Attributes for Characterizing Hydraulic Fractures in a Tight Siltstone Reservoir	3753
<i>N. Riazi, C. R. Clarkson</i>	
Well Economics and Production Outlook: Analysis of the Bakken Oil Play	3765
<i>Svetlana Ikonnikova, Gürcan Gülen, John Browning</i>	
Author Index	