

SPE/AAPG/SEG Unconventional Resources Technology Conference (URTeC 2023)

Denver, Colorado, USA
13 – 15 June 2023

Volume 1 of 5

ISBN: 978-1-7138-8804-8

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© (2023) by Society of Petroleum Engineers
All rights reserved.

Printed with permission by Curran Associates, Inc. (2024)

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

THEME 1: ASSET DEVELOPMENT, OPTIMIZATION, RE-COMPLETE MODELS, AND CASE STUDIES

Basin-Scale Geologic Clustering for Delaware Basin Type Curve Area Delineation: Operator Workflows and Applications	1
<i>James Cassanelli, Edward Wolfram</i>	
An Unconventional Approach to a Difficult-To-Develop Target: Application of Geomechanics and Clay Speciated Workflow to Successfully Drill the Wolfcamp D Formation in the Midland Basin	10
<i>David Brannan, C. Lance Reynolds, Shawn Renaud, Ryan Adams, Foster Bowman</i>	
Hybrid Expandable Liner System: A Performance-Enhancing, Cost-Effective Alternative to Bullhead Refracturing	24
<i>Kevin Eichinger, Sam French, Ken Day, Jared Brady, Ryan Epperson, Richard Leonard, Brad Leonard</i>	

THEME 1: COMPLETION OPTIMIZATION I

A Montney Field Study Measuring the Impact of Completion Designs on Near and Far Field Fracture Geometry.....	34
<i>Kristyn O'Byrne, Michael De Groot, David Bonar, Jerry Tkachyk, Scott Thiessen</i>	
NPV Max Development Optimization Utilizing Multidisciplinary Approach, a Case Study from the Permian Basin, USA.....	47
<i>Iris Haihong Wang, James Courtier, Claudia Garces</i>	

THEME 1: COMPLETION OPTIMIZATION II

First Operator's Tested Strategies in Vaca Muerta to Prevent EUR Degradation by Parent Child Effects.....	61
<i>Cristian E. Sarhan, Juan Manuel Gavilan, Juan Manuel Pitz</i>	
Utilizing a Multidisciplinary Approach to Reservoir and Completion Optimization Within the Woodford Shale Play of the Arkoma Basin	79
<i>Stephen C. Zagurski, Steve Asbill, Christopher M. Smith, Dick Leonard, Juan De La Garza, Tanner Wood, Paul McColgan, Michael Smith, Brad Leonard, Steven Bourgoyne</i>	

THEME 1: EOR IN UNCONVENTIONALS

Design of Chemical EOR in Unconventional Reservoirs.....	102
<i>Johannes O. Alvarez, Mohsen Tagavifar, Shashvat Doorwar, D. T. Vo, Varadarajan Dwarakanath, Taimur Malik, Dengen Zhou, Jesse Strickler, Lee (Rusty) Mathis, Scott Neal</i>	
Integrated Numerical Modeling of a Huff-N-Puff Pilot in Eagle Ford.....	127
<i>Caner Karacaer, Pavan Vajjha, Elif Agartan, Philip Chapman, Damon Bennett, Eric Hart, Cameron Thompson, Matthew Herrin, Sarah White, Chet Ozgen</i>	

THEME 1: MAXIMIZING DEVELOPMENT VALUE

Acid Restimulation in Legacy Wolfcamp Wells Utilizing Chlorine Dioxide (ClO ₂). an Operator Case Study of Reservoir Conductivity and Near Wellbore Fracture System Reactivation.....	147
<i>Panagiotis Dalamarinis, Brent Smith, Stephen Fusselman</i>	
Use of Multiphase Flowing Material Balance (FMB) to Evaluate Refracs in the Eagle Ford.....	155
<i>Steven Young, Trevor Stokes, Mathias Lia Carlsen</i>	
Optimizing Development of Stacked Reservoirs and Identifying Depleted Reservoir Intervals Using Geochemical Data.....	170
<i>Jana Bachleda, Kelsey Call, Doug Hardman, Eli Montoya, Muqing Jin, Jiang Wu, Faye Liu</i>	

THEME 3: GEOLOGICAL DRIVERS BEHIND STIMULATED AND DRAINAGE ROCK VOLUME: OBSERVATIONS, LESSONS LEARNED, AND STRATEGIES FOR ASSESSMENT

Heterogeneous Geomechanical Properties Within the Austin Chalk: Implications for Natural Fractures and SRV	187
<i>Christopher Zahm, Robert Loucks</i>	
Rock Fabric Not Principal Stress Dictates SRV: The Story of How a ~70 Year Old Discounted Data Point Still Plagues Our Industry and How True Triaxial Testing Finally Confirms it	199
<i>Giovanni Grasselli, Matthew G. Adams, Aly Abdelaziz</i>	

THEME 3: HOW DO YOU ACCESS THE ACREAGE AND RUNNING ROOM? TIPS AND KNOWLEDGE SHARING OF GEOLOGICAL SUBSURFACE CHARACTERIZATION

Predicting Facies Controls on Well Performance, Lea County nm	209
<i>Michael Maler, Jason Eleson, Andrew Lewis</i>	
Evaluating CO ₂ Storage Potential in Louisiana – an Analysis of the Entire Value Chain.....	217
<i>Graham Bain, Heather Leahey, Evan Macdonald, Brad Johnston, Alex Nevokshonoff</i>	
Integrated Reservoir Study for Successful CO ₂ Storage Planning: An Alberta Case Study of Depleted Gas Pools, Current and Future Readiness	225
<i>Alex M. D. Renaud, Bruce J. Hancock</i>	

THEME 4: FRACTURE CHARACTERIZATION USING DTS AND DAS

A Numerical Model for Analyzing Mechanical Slippage Effect on Cross-Well Distributed Fiber Optic Strain Measurements During Fracturing.....	243
<i>Xueling Song, Ge Jin, Kan Wu, Xincheng Wan</i>	
Distributed Fiber Optic Strain Measurement During Preload: Analyzing Strain Responses for Effective Fracture Geometry Estimation in Hydraulic Fracture Test Site 1 Phase III	261
<i>Qiaoyiru Wang, Kan Wu, Ge Jin</i>	
In-Well Stress Shadow and Near-Wellbore Fracture Geometry Diagnosis Using High-Resolution Distributed Strain Sensing Via Rayleigh Frequency Shift.....	274
<i>Aishwarya Srinivasan, Dana Jurick, Kyle Haustveit, Ge Jin, Artur Guzik, Kan Wu</i>	

THEME 5: DIAGNOSTICS AND MONITORING WITH GEOMECHANICAL MODELS I

- Optimizing Completion Design to Improve Near-Wellbore and Far-Field Cluster Efficiency:
Leveraging Downhole Data and Calibrated Physics-Based Models 289
Deepen Gala, Piyush Pankaj, Jake Kamps, Jenny Ryu, Nancy Choi, Min Zhang, Mukul M. Sharma
- Reexamining In-Situ Stress Interpretation Using Laboratory Hydraulic Fracturing Experiments 305
Zhi Ye, Ahmad Ghassemi
- Modeling of Fiber-Optic Strain Response When Pumping Stops to Verify Potential Continuation of
Fracture Extension..... 316
Kildare George Ramos Gurjao, Eduardo Gildin, Richard Gibson, Mark Everett

THEME 5: GEOMECHANICS IN LOWER CARBON

- Modeling of Fiber Optic Strain Responses to Shear Deformation of Fractures 331
Ruwantha Ratnayake, Ahmad Ghassemi
- Experimental Evaluation of Cement Integrity on Exposure to CO₂: Application to Geostorage..... 339
Sidi Mamoudou, Mark Curtis, Son Dang, Chandra Rai, Carl Sondergeld
- 3D Modeling and Analysis of Utah FORGE Reservoir Stimulation 350
Dharmendra Kumar, Ahmad Ghassemi, Baohua Liu

THEME 5: HYDRAULIC FRACTURE MODELING I

- Adaptive Time-Stepping to Capture Induced Seismicity for Unconventional Reservoir Exploration 361
Zheng Han, Rami M. Younis
- A Comprehensive Simulation Study of Hydraulic Fracturing Test Site 2 (HFTS-2): Part I –
Modeling Pressure-Dependent and Time-Dependent Fracture Conductivity in Fully Calibrated
Fracture and Reservoir Models..... 372
Han (Jake) Li, Jichao Han, Jiasen Tan, Matt Jones, Yu Zhao, Soodabeh Esmaili, Fadila Bessa, Vinay Sahni, Sriram Pudugramam, Shunhua Liu, Qian Li, James Kessler
- A Combined Discontinuous Galerkin / Cohesive Zone Model Numerical Simulator for Hydraulic
Fracturing and Application to Frac Hits Mitigation..... 395
Santiago Serebrinsky, Mauro Baldini, Federico Castez, Humberto Celleri, Isaías Gallana, Julieta Gutiérrez, Damián Smilovich

THEME 6: RESERVOIR SOURING AND NON-HYDROCARBON GAS

- Geochemical Analyses and Modeling for H₂S Risk Assessment at ConocoPhillips Montney Asset..... 413
Yishu Song, Elizabeth Watt
- Laboratory Simulations of H₂S Generation in the Bakken Petroleum System 424
Alexander Chakhmakhchev, Bethany Kurz, Timothy Nesheim, David Miller, Carol Grabanski, Saptashati Biswas, Marc Kurz, Nicholas Azzolina, James Sorensen
- In-Situ H₂S Origins and Occurrence in the Delaware Basin..... 444
Ye Wang, Crystal Pate, Carrie Martin, Guoxiang Zhang, Zsofia Poros, Riki Tasrianto, Des Jennings, Ward Whiteman, Josh Dark, Kristie McLin, Frances Esson, Andrew McCarthy

THEME 6: ROCK-FLUID INTERACTIONS

Nanoindentation on Fluid-Altered Shale and Implications for Proppant Embedment	457
<i>Qingyun Li, Cormac Killeen, Jason R. Trelewicz, Wei Xiong</i>	
Rock and Fluid-Based Correlation to Describe Surfactant Molecular Structure's Impact on Spontaneous Imbibition Experiments' Performance	468
<i>Abhishek Sarmah, Isaiah Z. Ataceri, Rohan Vijapurapu, Jingjing Zhang, Hadi Nasrabadi, David S. Schechter</i>	
Optimal Treatment and Reuse of Flowback and Produced Water: Selective Removal of Problematic Cations for Stability of Friction Reducers	482
<i>Yanze Zhang, Wajid Ali, Chunqing Jiang, Hassan Dehghanpour</i>	

THEME 7: APPLICATIONS IN RESERVES ESTIMATION AND PRODUCTION FORECASTING I

Predicting Hydrocarbon Production Behavior in Heterogeneous Reservoir Utilizing Deep Learning Models	506
<i>Fatick Nath, Sarker Asish, Happy R. Debi, Mohammed Omar S. Chowdhury, Zackary J. Zamora, Sergio Muñoz</i>	
Data Driven Oil Production Prediction and Uncertainty Quantification for Unconventional Asset Development Planning Through Machine Learning.....	522
<i>Xiang (Rex) Ren, Jichao Yin, Feng Xiao, Sasha Miao, Sri Lolla, Changqing Yao, Steve Lonnes, Huafei Sun, Yang Chen, James Brown, Jorge Garzon, Piyush Pankaj</i>	
Optimizing Shale Infill Development with AI: Child Well Meta Models	533
<i>Charles Connell, Kyle Lamotta, Nitin Chaudhary, Mickey Friedrich</i>	

THEME 7: APPLICATIONS IN RESERVES ESTIMATION AND PRODUCTION FORECASTING II

Unconventional Well Interference Detection Using Physics Informed Data-Driven Model	542
<i>Utkarsh Sinha, Prithvi Singh Chauhan, Hardikkumar Zalavadia, Sathish Sankaran, Clark Chen</i>	
System and Method for Automated Detection of Fracture Dependent Interactions	554
<i>Edgar Dias, Larry Bowden</i>	
Multi-Modal Data-Assisted Prediction and Analysis of Shale Gas Production Performance at Early Production Stage in Weirong Shale Gas Field, Sichuan Basin, China.....	562
<i>Tianrui Ye, Yitian Xiao, Yong Zhao, Haitai Cao, Chunyan He</i>	

THEME 7: NEW APPROACHES, ALGORITHMS, AND WORKFLOWS I

Predicting Facies, Rock, and Geomechanical Properties Using Convolutional Neural Networks: A Case Study from an Unconventional Shale Reservoir	580
<i>Ted Holden, Ruth Kurian, Mohammed Ibrahim, Daniel Hampson, Jonathan Downton</i>	

THEME 7: NEW APPROACHES, ALGORITHMS, AND WORKFLOWS III

A Workflow to Map Maturity and Fluid Properties from Public Production Reporting.....	587
<i>W. Kurt Rucker</i>	

THEME 7: SUBSURFACE CHARACTERIZATION, APPLIED CASE STUDIES, AND BUSINESS IMPLEMENTATION

Machine-Learning-Assisted Induced Seismicity Characterization and Forecasting of the Ellenburger Formation in Northern Midland Basin.....	596
<i>Niven Shumaker, Kaustubh Shrivastava, Mohamed Afia</i>	
Machine Learning Facilitates Prediction of Geomechanical Properties Directly from SEM Images in Unconventional Plays.....	608
<i>Heehwan Yang, Deepak Devegowda, Mark Curtis, Chandra Rai</i>	
Optimizing Production Potential of Unconventional Oil and Gas Wells: Insights from Statistical and Machine Learning Analysis of Well Spacing, Sequencing, and Landing Zone TVD Across Eleven North American Plays.....	620
<i>Harpreet Singh, Chengxi Li, Peng Cheng, Huailiang Liu</i>	

THEME 8: CASE STUDIES AND METHODS IN IOR/EOR AND EGR

Molecular Simulation Study of the Competitive Adsorption of Carbon Dioxide and Methane in Organic Shale – Implication for Enhanced Gas Recovery	665
<i>Ibrahim Gomaa, Isa Silveira De Araujo, Zoya Heidari, D. Nicolas Espinoza</i>	
Accelerating the Learning Curve: Driving Bottom-Line Performance Through Rapid Fracture Diagnostics in Shale Gas Plays	684
<i>Jesse D. Williams-Kovacs, Dmitry Deryushkin</i>	
Modeling on Enhanced Gas Recovery and Evaluation CO ₂ Sequestration Capacity Under Different Mechanisms in Shale Gas Reservoirs.....	699
<i>Weirong Li, Bingchen Hou, Zhenzhen Dong, Tianyang Zhang, Shihao Qian, Xin Wei, Hui Pu</i>	

VOLUME 2

THEME 8: FLOW AND PHASE BEHAVIOR FOR TIGHT OIL AND SHALE OIL: SHALE RESERVOIR SYSTEMS

PVT Correlations for Unconventional Reservoir Fluids — Bridging Lab and Field Applications	718
<i>Michael B. Cronin, Edward C. Wanat, Thomas A. Blasingame</i>	
Hydrocarbon Phase Behavior Under Nanoconfinement and Shale-PVT Model Development.....	736
<i>Bikai Jin, Lin Li, Hao Sun, Dengen Zhou</i>	
Injectivity-Productivity Changes During Cyclic Well Operations for H ₂ Storage in Unconventional Reservoirs.....	753
<i>Meruyert Makhatova, Chet Ozgen, Erdal Ozkan</i>	

THEME 8: SHALE FACILITIES AND ARTIFICIAL LIFT OPTIMIZATION

Improving Artificial Lift Timing, Selection, and Operations Strategy Using a Physics Informed Data-Driven Method.....	772
<i>Hardikkumar Zalavadia, Prithvi Singh, Utkarsh Sinha, Sathish Sankaran</i>	
Surface Compression and PAGL: Increase and Extend Production for Shale Wells	795
<i>Ozan Sayman, Kelsey Jones, Ryan Hale, Eduardo Pereyra, Cem Sarica</i>	
Experimental and Numerical Analysis of Toe-Up Trajectory Inclination Angle and Gas Lift Rate Effect on Unconventional Oil Well Performance	817
<i>Youssef Khetib, Ala Eddine Aoun, Kegang Ling</i>	

THEME 9: EUR AND PERFORMANCE PREDICTION: DECLINE CURVE ANALYSIS AND BEYOND

Early EUR Indicator for Permian Basin Unconventional Resources Based on Hourly Flowback Data	838
<i>Xueying Xie, Shunhua Liu, Courtney Leiker</i>	
Integrated Well Performance Analysis Methodology to Understand Production Performance and Identify Refracturing Candidates in Barnett Shale	852
<i>Eric Bryan, Rex Richard, Connor Holasek, Nima Hosseinpour-Zonoozi, Dilhan Ilk, Charles Melvin, Kevin Eichinger, Brian Rankosky, Brian Ingalls, Sam French, Ken Day</i>	
The Application of the Lognormal Cumulative Distribution Function (LCDF) for Time-Rate Interpretation and Forecasting of Wells in Unconventional Reservoirs.....	885
<i>David Waters, Eric Bryan, Dave Symmons, Dilhan Ilk, Thomas A. Blasingame</i>	

THEME 9: RESERVES ESTIMATION AND PRODUCTION FORECASTING

An Improved Analytic-Hierarchy-Quantitative Pre-Evaluation Method for Post-Fracturing Recoverability in Lamellation-Type Shale Oil Reservoir.....	914
<i>Shuo Wan, Bin Yuan, He Liu, Siwei Meng, Zhendong Lei, Wendong Wang</i>	

THEME 9: RESERVES IMPLICATIONS AND TYPE WELL PROFILES

Introducing a New Workflow to Improve Water Production Forecasts for Unconventional Reservoirs.....	933
<i>Mei Han, Xueying Xie, Shunhua Liu, Jiasen Tan</i>	
Bilinear Flow Analysis of Shale Gas Wells with Dynamic Hydraulic Fracture Conductivity	943
<i>Ivan C. Aldana, I. Yucel Akkutlu, W. John Lee</i>	

THEME 1: DEVELOPMENT OPTIMIZATION

Leveraging Reservoir and Fracture Modeling to Optimize Well Landing, Spacing, and Completion Size in the DJ Basin.....	964
<i>Jean-Philippe Junca-Laplace, Joe Dunn, Keith Ramsaran, Jaime Vargas, David Brown, Hilary McKenna</i>	

Assessing the Potential of Three Assets: From Exploration to Development, a Multidisciplinary Integration Case.....	977
<i>Federico Gonzalez Tomassini, Juan Jose Fernandez, Marcelo Frydman, Victoria Lazzari, Juan Pablo Palacio, Martín Vitolo, Alfredo Moler, Ivan Lanusse Noguera</i>	

THEME 1: IMPROVING COMPLETION DESIGNS

"A Shift Or Not a Shift?" that Was the Question: Robust Qualification and Testing of Available "Unlimited" Frac Sleeve Systems Yield Varied Results	997
<i>E. R. Davis, J. J. Constantine, M. L. White, M. M. Ferris, M. J. Watson, M. M. Schinnour, N. R. Zwarich, M. E. Woodard, K. N. Metzgar, M. Nozaki</i>	
Optimizing Field Development Across Northern Delaware Basin for the Wolfcamp C	1028
<i>M. D. Rincones, I. Perez, J. Dark, A. Dutta, A. Wilkinson, Y. Wang, S. Bey, J. Hanzel, B. Biurchieva, P. Hoang</i>	

THEME 1: LEVERAGING THE FIBER

Using Disposable Fiber to Monitor Simul-Frac Stimulation Fracture Growth.....	1047
<i>Kim Owens, Hannah Chittenden, Michael Schult, Casey Cox, Kay Warner, Dane Byrd, Palmer Van Buskirk, Travis Payeur, Sean Machovoe</i>	
Single-Use Fiber Analysis on Fault-Driven Frac Propagation Anomalies in the Midland Basin	1065
<i>Dugan R. Hughes, Jill Thompson</i>	

THEME 1: MODELING AND DEVELOPING PERMIAN BASIN I

Modeling the Unconventional Way: A Novel Midland Basin Case Study on How to Simulate Reservoir Models Without Altering Stimulated Fracture Geometries	1077
<i>C. Lance Reynolds, David Brannan</i>	
Field Development Optimization in Midland Basin: An Integrated Multi-Disciplinary Approach.....	1097
<i>Antonio Wilkinson, Jason Jweda, Brady Kolb, M. D. Rincones, Kelli Snidow, Carl Warren</i>	

THEME 1: MODELING AND DEVELOPING PERMIAN BASIN II

US Tight-Oil Efficiency: A Permian Basin Case Study.....	1112
<i>Mohammed Althani, Ian Lange</i>	
An Integrated Approach to Development Optimization Using Monitor Wells and Hydraulic Fracture Diagnostics in the Permian Basin.....	1127
<i>Ripudaman Manchanda, Yueming Liang, Holger Meier, Karthik Srinivasan, Sergio Leonardi, Mary Johns, Shelby Lyons, Owen Hehmeyer, Justin Eckes, Jonathan Zybala, Alberto Ortega, Kshitij Mohan, Dalton Vice, Satish Kumar Dayalan, Saurabh Rasal, Jake Kamps, Kendal Decker, Peeyush Bhargava, Prasad Sumant, Kaustubh Kulkarni, Isha Sahni, Matthew Bourke, Rayssa Sanchez</i>	

THEME 1: QUANTIFYING, MITIGATING AND/OR OVERCOMING PARENT-CHILD EFFECTS

Restricting Adverse Fracture Driven Interactions Through Completion Optimization and Active Guidance: Case Studies from the Southern Delaware Basin1148
Katura Brady, Brian Atwell, Joseph Becerril, Tom Johnston, Kevin Wutherich

Eagle Ford Parent Well Frac Hit (Frac Driven Interaction) Impact Characterization, Prediction, and Mitigation1168
Yongshe Liu, Lucy Luo, Susan Naiser, Glennis Sylvester, Marina Ramirez Medina, Junjing Zhang, Dong Song, Grant Evans, Preston Howard, Duncan Thom, Bo Hu, Taufeeq Mian

THEME 1: SUSTAINABLE ASSET DEVELOPMENT

Comparison of Numerical LDAR Assessment Methods in Methane Detection Technologies1183
Shuang Zhang, Vikram Jayaram, Aaron Lazarus, Tianze Qian, Carrie Reese, Sri Sridharan

THEME 2: CO2 SEQUESTRATION PETROPHYSICAL PROPERTY MODELING

Reactive Transport Modeling of Anthropogenic Carbon Mineralization in Stacked Columbia River Basalt Reservoirs1195
Ruoshi Cao, Katherine A. Muller, Quin R. S. Miller, Mark D. White, Diana H. Bacon, H. Todd Schaefer

Effect of CO2 Dissolution on Fluid Flow and Phase Behavior in Oil-Water Systems in Shale Reservoirs 1203
Yilei Song, Zhaojie Song, Yufan Meng, Haoming Ma, Zhangxin Chen, Yunfei Zhang, Lichao Zhang, Dong Feng

Effects of CO2 Exposure on Unconventional Reservoir Rock Microstructure 1215
Mark Curtis, Sidi Mamoudou, Felipe Cruz, Son Dang, Chandra Rai, Deepak Devegowda

THEME 2: NEW MATERIALS AND INNOVATIVE TECHNOLOGIES

Precise Determination of Reservoir Fluids in Jurassic Kerogen from Pressurized Cores: Challenges to Success 1224
Kim Long Nguyen, Rasha Al Morakhi, Mohammed Dasma, Mahmoud F. Shehab El Dein, Nami Al-Mutairi, Naveen Verma, Riyad Quttainah, Jason Ashby, Charlie Verret, Chris Rilling, Joe Ramoin, Jonathan Antia, David Wunsch, Tobias Rothenwänder, Erik Anders, Tobias Deutrich, Pritish Mukherjee, Mohamed Janem

Can Transient High Gamma Ray Be Used to Observe Phase Behavior and Fluid Transport in Unconventional Reservoirs? 1237
Terence P. O'Sullivan

Remote Monitoring of Stage Performance from Zonal Returns of Nanoparticle Tracers Integrated in Shaped Charges Liners to Surface with Flowback 1250
Ting Roy, Kamel Ben Naceur, Casey Harrison, James Shelton, Aaron Hall, Holden Harrison, Ian Henkes, Kenny Jones, Otman Algadi, Hifzi Ardic, Christian Wilkinson, Indranil Roy

THEME 3: INTERNATIONAL AND EMERGING CHALLENGES OF UNCONVENTIONAL RESOURCES

Evaluating the Potential of the World-Class Najmah Unconventional Reservoir: Collaborative Approach to Design a Pilot Well 1268
Mohammad Al-Bahar, Talal Al-Adwani, Vandana Suresh, Nejoud Al-Ostad, Anas Al-Rukaibi, Abrar Al-Najjar, Vladimir Caicedo, Gary Robinson, Ting He, Robert Johnston, Nima Hosseinpour-Zonoozi

Complex Structural Domains and Their Impact on the Design of Development Plans. Case Study Vaca Muerta Fm. in a Shale Oil Core Area, Neuquén Basin, Argentina..... 1281
Julia Elena Bouhier, Franco Vittore, Carolina Bernhardt, María Florencia Rincón

An Integrated Approach to Building a 3D Discrete Fracture Network Model of an Unconventional Naturally Fractured Reservoir, Kuwait..... 1295
Mariela D. Pichardi Hernandez, Raphael Altman, Girija S. Padhy, Arup Sadhu, Pratik Sangani, Alaa Mohammad, Tahani Al Rashidi, Priyavrat Shukla

THEME 3: WHATS IN YOUR ROCK: GEOLOGICAL INTEGRATION THAT IMPACTED GO-FORWARD BUSINESS DECISIONS

Reservoir Modeling in Tight Rocks Using Computational Stratigraphy to Capture Stratigraphic Architecture and Heterogeneity: Examples from the Wolfcamp of the Delaware Basin..... 1308
Shahzad Khan, Ryan D. Wilson, Tao Sun, Lewis Li

High-Resolution Core Study Relating Chemofacies to Reservoir Quality: Examples from the Permian Wolfcamp XY Formation, Delaware Basin, Texas..... 1316
Shaskia Herida Putri, Zane Jobe, Lesli J. Wood, Jesse Melick, Marsha French, Katharina Pfaff

THEME 4: NEW AND INNOVATIVE TECHNOLOGIES IN RESERVOIR IMAGING AND CHARACTERIZATION

Extracting High Fidelity Geological Information from 3D Seismic and Well Data..... 1333
Marianne Rauch

Application of Seismic Super Resolution to Improve Drilling Planning and Risk Mitigation in Delaware Basin..... 1339
Riki Tasrianto, Chengbo Li

Integrated Workflows for Drilling Optimization and Enhanced Production 1347
Jakob Heller, Venkatesh Anantharamu, Andrew Lewis, Bruce Karr, Ron Bianco

THEME 5: INFILL DRILLING AND REFRACTURING; APPLICATIONS AND LESSONS LEARNED

A Success Story: Screening and Optimizing Refracs in the Eagle Ford..... 1362
Garrett Fowler, Jose Zaghoul, David Jones, Lindsey Hall-Wiist, Drew Hopson, Sarah Allen, Matteo Picone, Adrian Morales, Matteo Marongiu Porcu, Mark McClure, Dave Ratcliff

A Geomechanics and Pore Pressure Informed Stage Level Optimization Case Study for Unconventional, Infill Development in the Powder River Basin	1380
<i>Joel Mazza, Justin Kegel, Steve Van Delinder, Tom Hewett, Beth Emborsky, Scott Patrick</i>	
Refrac and Re-Complete Whole History in the North Dakota: Determining Detailed Type and Sub-Type of Refrac and Incremental Production	1397
<i>Tim Leshchyshyn, Angela Vande, Robert Barba, Brad Leshchyshyn, Hudson Pastuszko, Jasmine Singer, Angelina Pastuszko</i>	

VOLUME 3

THEME 5: DIAGNOSTICS AND MONITORING WITH GEOMECHANICAL MODELS II

Geomechanics Modeling of Strain-Based Pressure Estimates: Insights from Distributed Fiber Optic Strain Measurements	1416
<i>Wei Ma, Kan Wu, Ge Jin</i>	
Optimizing Completions by Enhancing Near-Field Connectivity and Mitigating Stress Shadowing in Real-Time Via Acoustic Based Workflow	1433
<i>Muhammad Khan, Jim Alsup, Nathan Crawford, Josh Kroschel</i>	
A Novel Choke Management Evaluation Workflow Using Calibrated Hydraulic Fractures and Embedded Discrete Fracture Model for Deep Shale Gas Reservoirs	1446
<i>Chuxi Liu, Cheng Chang, Xingchen Wang, Wei Yu, Jijun Miao, Kamy Sepehrnoori</i>	

THEME 5: GEOMECHANICS IN WELL DESIGN, CONSTRUCTION, AND DRILLING

Mechanical Characterization, Anisotropy, and Failure Pattern of Unconventional Reservoirs for Wellbore Stability and Fracture Enhancement	1453
<i>Aly Abdelaziz, Kareem R. Aboqyanah, Matthew Adams, Giovanni Grasselli</i>	
Geomechanics Complexity Associated with Sub-Seismic Fold Structures in a Horizontal Well	1465
<i>Dee Moronkeji, Weiwei Wu, Ryan Hillier, Christopher Wolfe</i>	
Chemically Enhance Hydraulic Fracturing by Maintaining Proppant and Formation Integrity	1484
<i>Shawn Lu, Chao Yang, Kevin Smith, Chad Bruce</i>	

THEME 5: HYDRAULIC FRACTURE MODELING II

Conductive and Propped Networks of Induced Hydraulic Fractures and Reactivated Fracture Networks - Evidence from the HFTS-1 in Situ Experiments	1498
<i>Michael Gross, William Dershowitz</i>	
Multidimensional, Experimental and Modeling Evaluation of Permeability Evolution, the Caney Shale Field Lab, OK, USA	1505
<i>A. Katende, G. Awejori, M. Benge, S. Nakagawa, Y. Wang, F. Xiong, J. Puckette, M. Grammer, J. Rutqvist, C. Doughty, A. Bunger, T. Paronish, D. Crandall, J. Renk, M. Radonjic</i>	
Optimization of the Proppant Placement Through the Perforations in Multistage Hydraulic Fracturing: A Laboratory-Scale Experimental Investigation	1527
<i>Nadia Mouedden, Aimen Laalam, Harry Feilen</i>	

THEME 6: SOURCE ROCK EVALUATION

- Improved Oil Saturation and Producibile Hydrocarbon Evaluation Via Novel Thermal Extraction Methods 1544
J. Alex Zumberge, Catherine Donohue, Adam Turner
- Simulation of Thermal Maturity in Kerogen Type II from the Bakken Shale Via Anhydrous and Hydrous Pyrolysis 1557
Thomas Gentzis, Majid Safaei-Farouji, Mehdi Ostadhassan
- Oil and Gas Generation, Migration, Production Prediction, and Reservoir Characterization of Northern Denver Basin: Implication from the Total Petroleum Systems 1578
Mohammad 'Wahid' Rahman, Mathew Fox, Darrell Kramer, Chris Mullen

THEME 7: NEW APPROACHES, ALGORITHMS, AND WORKFLOWS I

- Application of Combined Statistics, Machine Learning and Game Theory Approach for Shale Gas Production Performance Evaluation: Insights of Frac-Hit Timing and Severity 1590
Chunyu Zhang, Yuewei Pan, Wei Ma, Ran Bi
- Updated Formation Maps Provide Greater Detail for the Stacked Unconventional Plays of the Permian Basin (Midland Basin) 1605
Olga Popova, Gary Long

THEME 7: NEW APPROACHES, ALGORITHMS, AND WORKFLOWS II

- Mechanistic Understanding and Data-Driven Prediction of Liquid Loading in Long-Lateral Oil Wells in Unconventional Reservoirs 1625
Xiao Zhang, Amit Kumar, Tyler Nahhas, Willy Manfoumbi, Christopher Frazier, Gunta Chomchalerm, Yang Chen, Isara Tanwattana, Tamas Toth, Huafei Sun, Aaron Shinn, Peng Xu
- Screening and Ranking of Refractured Well Candidates: Insights from Performance Analysis of 14 Unconventional Plays Using Machine Learning Approach..... 1641
Cesar Velasquez, S. Hamed Tabatabaie
- Deep Learning Models for Methane Emissions Identification and Quantification 1655
Ismot Jahan, Mohamed Mehana, Bulbul Ahmmed, Javier E. Santos, Daniel O'Malley, Hari Viswanathan

THEME 7: NEW APPROACHES, ALGORITHMS, AND WORKFLOWS III

- Use of Machine Learning to Predict Maximum Borehole Diameter for Multi-Stage Frac Completions..... 1666
Murtadha J. Al Tammar, Khaqan Khan, Rima T. Alfaraj, Rayan A. Alidi, Khalid M. Alruwaili
- Reducing Methane Emissions: Implementing Data Science Informed Operation and Maintenance Work Practices Using Continuous Monitoring Technology 1678
Kathleen Jenkins, Carol A. Brereton, Alex Macgregor, Andrew Walsh, Nick Goodman

THEME 8: EOR IN UNCONVENTIONALS

- Reservoir Mechanisms of Unconventional Gas Injection EOR; Insights from Field Trials in the Eagle Ford 1685
David E. Haddad, Hui Long, Rachana Agrawal, Harish T. Kumar
- Feasibility of CO₂ Storage in Depleted Unconventional Oil and Gas Reservoirs: Capacity, Microscale Mechanism, Injectivity, Fault Stability, and Monitoring..... 1703
Sheng Peng, Leopoldo M. Ruiz Maraggi, Shuvajit Bhattacharya, Katy Yut, Tim McMahon, Mahdi Haddad

THEME 8: NOVEL PRODUCTION IMPROVEMENT METHODS

- Y-CALCITE: A Novel Geomimetic Technology for Hydraulic Fracturing Fluid and Proppant Generation in Unconventional Shale Reservoirs 1726
Remigio Ruiz, Augusto N. Varela, Maria M. Messina, Dario G. Robledo, Juan M. Acosta
- Chemical in Gas Dispersions: The Evolution of a Novel Concept for IOR/EOR in Tight Formations 1732
Alonso Ocampo, Alejandro Restrepo, Kelly Díez, Martin Rylance, Jonny Patiño, Juan Rayo, Diego Ayala
- Multi-Basin Case Study: Remediating Damage from Fracture Driven Interactions Utilizing a Rigless Chemical Process..... 1753
Mike Lantz, David Garza, Japan Trivedi

THEME 8: PRESSURE TRANSIENT TESTING, DFIT, AND WELL TESTING

- Pressure Buildup Interpretation in Unconventional Wells..... 1768
Jorge A. Acuna
- Operational Application of Chow Pressure Group Methodology in the Midland Basin and Resulting Development Impact 1781
Zach Petter, Carl Warren, Raul Paz, Jamie Bacon, Alaina Carter, Bailey Stang, M. D. Rincones

THEME 8: SURFACTANTS AND NANOFLUIDS FOR EOR IN UNCONVENTIONALS

- Surfactant EOR Improves Oil Recovery in a Depleted Eagle Ford Unconventional Well - A Case Study..... 1794
I. Z. Ataceri, I. W. R. Saputra, A. R. Bagareddy, M. H. Elkady, D. S. Schechter, G. W. Haddix, V. A. Brock, K. H. Raney, C. W. Strickland, G. R. Morris
- A Systematic Laboratory and Model-Based Surfactant Screening Workflow for Enhanced Recovery Via Wettability Alteration in the Eagle Ford..... 1812
Jason Jweda, Russ Bone, Hesham El-Sobky, Viet Nguyen, Paul Carman, Hui Long, William Beveridge, Logan Warren, Ronald Bonnie, Tianmin Jiang, Jennifer Hoyt, Andrew Macmillan, Kristie McLin

THEME 9: FUTURE OF PRODUCTION FORECASTING: DATA-DRIVEN MODELS AND PHYSICS-BASED SOLUTIONS I

Field Application of a Novel Multi-Resolution Multi-Well Unconventional Reservoir Simulation: History Matching and Parameter Identification..... 1832
Jia Fu, Hongquan Chen, Changqing Yao, Shohei Sakaida, Erich Kerr, Andrew Johnson, Akhil Datta-Gupta, Ding Zhu, A. Daniel Hill

Physics Informed Data-Driven Models for Discovery of Flow Physics and Forecasts in Unconventional Reservoirs 1847
Hardikkumar Zalavadia, Utkarsh Sinha, Prithvi Singh, Zhenyu Guo, Sathish Sankaran

How Much Data is Needed to Create Accurate PDP Forecasts? 1878
Austin Lim, Alexander Cui, Ted Cross

THEME 9: FUTURE OF PRODUCTION FORECASTING: DATA-DRIVEN MODELS AND PHYSICS-BASED SOLUTIONS II

Application of Fractional Dimension RTA to Gas Wells in Haynesville Including Parent-Child Effects..... 1887
Jorge A. Acuña

Physics-Based and Data-Driven Production Forecasting in the Eagle Ford Shale 1900
Wardana Saputra, Tadeusz Patzek, Carlos Torres-Verdin

A Robust Workflow to Characterize Uncertainties of a Horizontal Well Pad: Multi-Well History Matching for Unconventional Reservoirs..... 1918
Chuxi Liu, Cheng Chang, Xingchen Wang, Wei Yu, Ning Li, Jijun Miao, Kamy Sepehrnoori

THEME 9: WELL SPACING AND WELL INTERFERENCE IMPACT I

Fractional Dimension Rate Transient Analysis Applied to Parent-Child Effects in Unconventional Wells 1931
Jorge A. Acuña

Understanding the Advantages and Disadvantages of Unconventional Well Stacking and Interference..... 1940
Santiago Rivera, Yongduk Shin

Multiphase Flowing Material Balance for Well Groups 1954
Leslie Thompson, Barry Ruddick, Mathias Lia Carlsen, Curtis Hays Whitson

THEME 9: WELL SPACING AND WELL INTERFERENCE IMPACT II

Empirical and Semi-Analytical Workflow to Determine Optimal Spacing in Unconventional Reservoirs..... 1968
C. Coley, M. D. Rincones, K. Wiggs, W. Prabowo

A Study on Well Placement and Performance Forecasting in Uinta Basin Considering Geological Uncertainty 1980
Esmail Eltahan, Mauricio Fiallos-Torres, Reza Ganjdanesh, Kamy Sepehrnoori

A Comprehensive Review of Fracture-Driven Interaction in Unconventional Oil and Gas Plays: Characterization, Real-Time Diagnosis, and Impact on Production.....	2001
<i>Harpreet Singh, Peng Cheng, Yuwei Pan, Chengxi Li, Yu Liu, Xi Wu, Mary Van Domelen, Samuel Rogers, Arash Dahi Taleghani, Meng Cao</i>	

THEME 1: DEVELOPING DELAWARE BASIN

Gas Re-Injection Pilot to Mitigate Flaring and Shutdown in Permian Basin for Unconventional Wells.....	2050
<i>Yula Tang, Stefan Lattimer, Christine Defriend, Jason Parizek, Katrina Ostrowicki, Hemant Kumar, Leif Larsen</i>	

Unconventional Gas EOR: Recovery Mechanisms and Piloting.....	2065
<i>Hao Sun, Kelly Krezinski, Johannes Alvarez, Dengen Zhou, Kumar Devesh, Bikai Jin, Wei Wang, Victor Torrealba, Tom Tang, Lin Zuo, Kenneth Griffin, Daniel Emery, Lee (Rusty) Mathis</i>	

THEME 2: EMERGING PETROPHYSICAL EVALUATIONS

Characterizing Oil and Water Saturation in the Bakken Petroleum System.....	2079
<i>Peter Kaufman, Aaron Rodriguez, Alex Zumberge, Carlos Miranda, Nathaniel Piper, Jadranka Milovac, Joshua Miller</i>	

Dielectric Log Calibration Using a Unique Core-Based ElectroMagnetic Response (EMR) Workflow: A Case Study	2093
<i>R. Ray Hanna, Carl Merkt</i>	

VOLUME 4

The Impact of Thermal Maturity on the Organic-Rich Shales Properties: A Case Study in Bakken.....	2105
<i>Mohamed Lamine Malki, Vamegh Rasouli, Mohamed Mehana, Ilyas Mellal, Mohammad Reza Saberi, Billel Sennaoui, Hichem A. K. Chellal</i>	

Fluid Definitions and Pore Space Partitioning: Integrating NMR and Closed Retort Data.....	2123
<i>J. Alex Zumberge, Michael J. Dick, Dragan Veselinovic, Nathaniel C. Piper, Adam Turner, Jadranka Milovac</i>	

THEME 2: HIGH AND LOW FIELD NMR APPLICATIONS

Improvements in Logging Operations and Analysis with a Customized NMR Unconventional Acquisition Mode in the Permian Basin.....	2132
<i>Mohammad Azeem Chohan, Katerina Yared</i>	

Understanding NMR Responses of Different Rock-Fluid Components Within Organic-Rich Argillaceous Rocks: Comparison Study Across 2, 12, and 23 MHz Spectroscopy.....	2142
<i>Son T. Dang, Elizabeth G. Krukowski, Michael J. Dick, Dragan Veselinovic, Rafael A. Mendoza, Rayvan Watson, Chandra Rai, Carl Sondergeld</i>	

Using NMR to Quantify Mineralization-Induced Porosity Changes in Varied Lithologies: IOR and Carbon Storage Applications	2154
<i>Shaina Kelly, Jacob Tielke, Michael Dick, Dragan Veselinovic</i>	

THEME 3: APPLICATION OF GEOLOGICAL TOOLS TO UNLOCK ADDED VALUE: IS THERE AN UPSIDE?

Geological Characterization of Vaca Muerta Fm. Through Virtual Outcrops Technology, Neuquen Basin, Argentina 2165
Franco Vittore, Patricio Desjardins, Diego Licitra

Understanding the Stratigraphic ‘Big Picture’ by Utilizing Core-Calibrated, Wireline Facies: An Example from the Middle Leonard Interval, Midland Basin, West Texas 2182
David L. Carr, H. Scott Hamlin

How Much Do Natural Fractures Matter in the Permian Basin? Systematic Study Using Cores, Image Logs, Physics Based Models, RTA, and Fiber Data 2199
Deepen Gala, Leonel Gomez, Mary Johns, Piyush Pankaj, Rodrick Myers, Holger Meier, Darren McLendon

Hydrocarbon Mobility as a Proxy for Reservoir Quality and Migration 2214
Adam Turner, Catherine Donohue, J. Alex Zumberge

THEME 4: QUANTIFYING COMPLETIONS EFFICIENCY USING DTS AND DAS

Case Study: Completion and Well Placement Optimization Using Distributed Fiber Optic Sensing in Next-Generation Geothermal Projects..... 2224
Aleksei Titov, Jack Norbeck, Sireesh Dadi, Katharine Voller, Mark Woitt, Steven Fercho, Emma McConville, Camden Lang, Saurabh Agarwal, Christian Gradl, Timothy Latimer

Quantitative Analysis of HFTS-2 Completion Designs Using Cross-Well Strain Measurement 2236
Joseph Mjehovich, Aishwarya Srinivasan, Wen Wang, Kan Wu, Ge Jin

Fracture Height Quantification from Vertical and Horizontal Section Fiber Measurements: A Comprehensive Study Using LF-DAS Measurements from HFTS 2 Dataset 2255
Aishwarya Srinivasan, Joseph Mjehovich, Kan Wu, Ge Jin, Wen Wang, George Moridis

Recent Advances and New Insights of Fiber Optic Techniques in Fracture Diagnostics Used for Unconventional Reservoirs 2276
Fatick Nath, S. M. Shamsul Hoque, Md. Nahin Mahmood

THEME 4: QUANTITATIVE IMAGING AND INTERPRETATION OF NATURAL AND INDUCED FRACTURES AND THEIR EFFECT ON PRODUCTION

Evaluating the Hydraulic Fracture Through Acoustic Reflection Imaging and Production Logging for Water Diagnostic Beyond Wellbore: A Case Study from Chang 8 Tight Sand in the Ordos Basin, China 2296
Guangsheng Liu, Dajian Li, Gang Zheng, Hongzheng Zhu, Wenhao Cui, Yanyan Chen, Hongzhi Guo, Zheyuan Huang, Dongdong Cheng, Zhaoya Fan, Xiang Li

Geomechanical Modeling of Fracture Growth in Naturally Fractured Rocks: A Case Study of the Utah FORGE Geothermal Site 2306
Meng Cao, Mukul M. Sharma

Developing a High-Efficiency Method for Field-Scale Simulation of a Tight and Naturally Fractured Reservoir in the Williston Basin..... 2317
Xincheng Wan, Lu Jin, Todd Jiang, James A. Sorensen, Chenyu Wu, Ahmed Merzoug

THEME 5: HYDRAULIC FRACTURE MODELING III

Analysis of Uniformity of Proppant Distribution Between Clusters Based on a Proppant-Wellbore Dynamics Model	2338
<i>Egor Dontsov, Christopher Hewson, Mark McClure</i>	
A Rapid and Robust Approach for Optimizing Production in the Northern Delaware Basin	2350
<i>Cyrille Defeu, Brian Clark, Eric Wigger, Mike Mayerhofer, Todd Passmore, John Speight</i>	
Compaction in Unconventional Carbonate Reservoir Rocks and Its Effect on Well Completions and Hydraulic Fracturing	2367
<i>Roberto Suarez-Rivera, Evan Kias, John Degenhardt, Angelica Rios Alvarez, Rabah Mesdour, Shannon Eichmann, Anuj Gupta</i>	

THEME 5: PRODUCTION SIMULATION, FORECASTING, AND OPTIMIZATION

A Comprehensive Simulation Study of Hydraulic Fracturing Test Site 2 (HFTS-2): Part II - Development Optimization in the Delaware Basin Using an Integrated Modeling Workflow	2386
<i>Jichao Han, Yu Zhao, Han (Jake) Li, Jiasen Tan, Fadila Bessa, Shunhua Liu, Vinay Sahni, Venkateswaran Sriram Pudugramam, Xueying Xie, Hamid Behzadi</i>	
Evaluation of Long-Term Production Performance and EUR Impact Associated with Pressure-Drawdown Management in Shale Gas Reservoir Using a New Mathematical Model	2403
<i>Yunsheng Wei, Meng Wang, Yuewei Pan, Yihui Zhu, Junlei Wang, Wei Ma</i>	
Poroelastic Prediction of Matrix Compressibility and Pressure Dependent Permeability: Impact on Simulated Recovery Factors in Permian Basin Resource Rocks, USA	2415
<i>Brian Crawford, Michael Cronin, Olabode Ijasan, Mathilde Luycx, Darren McLendon, Shreerang Chhatre</i>	
Multi-Resolution Coupled Flow and Geomechanics Modeling Using Fast Marching Method.....	2428
<i>Kazuyuki Terada, Hongquan Chen, Atsushi Iino, Akhil Datta-Gupta</i>	

THEME 6: DRAINAGE AND MIGRATION

Time-Lapse Produced Water Source Allocation: Characterizing Impact of Fracture-Driven Interaction, Insights on Life-Of-Well Water Production Profile and Asset Development Optimization in the Permian Midland Basin	2445
<i>Wei Wang, Wei Wei, Caroline Studnicky, Scott Reed</i>	
Integrated Approaches for Wells Interference and Drainage Assessment in Vaca Muerta Shale Play, Argentina	2459
<i>Martin E. Fasola, Luciana De Marzio, Mariano I. Suarez</i>	
Gas Carbon Isotopic Composition Implications on Well Productivity and Thermal Maturity in the "Closed System" of Duvernay Fm., Western Canada Sedimentary Basin	2479
<i>Gabriela Gonzalez Arismendi, Luis E. Valencia, Karlis Muehlenbachs, Austin Springer, Adam Vigrass, Ryan Macauley</i>	
Contrasting Fluid Migration Patterns in an Unconventional Hybrid Play - Geological Controls and Development Implications (Montney Play, Western Canada)	2496
<i>Tristan Euzen, Neil Watson, David Cronkwright, Scott McLeod, Brennen Hosegood</i>	

THEME 6: NOVEL GEOCHEMICAL APPLICATIONS

Experimental and Numerical Simulation Using X-Ray Photoelectron Spectroscopy (XPS) and PHREEQC for Geochemical Interaction Effect on ScCO ₂ -EOR and Storage in Unconventional Reservoirs.....	2503
<i>Billel Sennaoui, Hui Pu, Nuri Oncel, Mohamed Lamine Malki, Samuel Afari</i>	
Biogeochemical Reactions in a Diffusion-Limited Zone Around Wellbore Cement Relevant to Underground Hydrogen Storage.....	2518
<i>Christopher Rooney, Qingyun Li</i>	
Modeling Hydrogen Geochemistry Using Fundamental Quantum-Mechanical Approaches to Enable Hydrogen Geostorage.....	2530
<i>Vardhan Satalkar, Deepak Devegowda, Chandra Rai, Son Dang</i>	

THEME 7: CONTRIBUTIONS OF DATA SCIENCE TO IMPROVED WORKFLOWS IN DRILLING AND COMPLETION

Data-Driven Completion Optimization for Unconventional Assets	2540
<i>Diana Chinnaz Johan, Priyavrat Shukla, Kaustubh Shrivastava, Manas Koley</i>	
Data-Driven Analysis for Causality of Parent–Child Interactions in the Bakken.....	2551
<i>Kyoung Suk Min, Alexander V. Chakhmakhchev, Xue Yu, Nicholas A. Azzolina, Darren D. Schmidt, Bethany A. Kurz, James A. Sorensen</i>	
Estimating Real-Time Pore Pressure at the Bit Via Machine Learning	2569
<i>Matthew Reilly, Gareth Taylor, Orlando De Jesus, Muhlis Unaldi, John Thurmond, Mike Party, Koda Chovanetz</i>	
Maximizing Efficiency of Deep-Reinforcement Learning Agents in Autonomous Directional Drilling with Hyperparameter Optimization.....	2575
<i>Vivek Kesireddy, Georgy Kompantsev, Sheelabhadra Dey, Eduardo Gildin, Enrique Z. Losoya, Narendra Vishnumolakala</i>	

THEME 8: RESERVOIR PRODUCTION AND RECOVERY MECHANISMS

Improving Recovery Potential Through Understanding Parent-Child Well Interactions in a Heterogeneous Shale Play	2591
<i>C. M. Freeman, H. Sarak, T. Firincioglu, C. Ozgen</i>	
Experimental Observation of Diffusion as the Main Drive Mechanism in Unconventional Shales.....	2607
<i>Son Dang, Sidi Mamoudou, Chandra Rai, Carl Sondergeld</i>	
An Integrated Triple-Porosity Reservoir Modeling Case Study to Evaluate/Improve Well Spacing in Uinta Basin	2616
<i>M. Gaddipati, J. Hervey, R. Zaback, M. Boyce, K. Babcock, O. Apaydin, T. Firincioglu</i>	

THEME 9: FUTURE OF PRODUCTION FORECASTING: DATA-DRIVEN MODELS AND PHYSICS-BASED SOLUTIONS III

RGNet for Multi-Well Forecasting in Unconventional Reservoirs.....	2634
<i>Zhenyu Guo, Sathish Sankaran, Ying Li</i>	

Bayesian Variable Pressure Decline-Curve Analysis for Shale Gas Wells	2644
<i>Leopoldo M. Ruiz Maraggi, Mark P. Walsh, Larry W. Lake, Frank R. Male</i>	
Understanding Unconventional Reservoirs with an Integrated Physics and Machine Learning Based Methods – Case Studies and Novel Approaches from Tight Gas and Tight Oil Reservoir.....	2669
<i>Gaurav Sharma, Breandan Gaffney, Jaron Van Dijken, Jim Lee, Marshal Doig</i>	
Survival Analysis Predicts Flow Regime Changes for Permian Basin Tight Oil Wells.....	2683
<i>Frank Male, Robin Dommissie</i>	

THEME 9: PRODUCTION DIAGNOSTICS: UNDERSTANDING THE BIG PICTURE ON PRODUCTION FORECASTING

A Novel Production Profiling Workflow Using Microseismic Data and Distributed Temperature Sensing Data for Unconventional Reservoirs.....	2696
<i>Chuxi Liu, Cheng Chang, Wei Yu, Sha Liu, Jijun Miao, Kamy Sepehrnoori</i>	
Estimating Fracture Length and Density Using Depletion Mapping from the Drilling Data of Infill Well Pads.....	2704
<i>Kevin Wutherich, Brian Sinosic, Erica Coenen</i>	
Revealing the Production Drivers for Refracs in the Williston Basin	2714
<i>Alexander Cui, Tim Gilbertson, Dillon Niederhut</i>	

THEME 1: OPERATORS FORUM: CASE STUDIES HIGHLIGHTING THE MULTIDISCIPLINARY APPROACH TO EXPLORATION, APPRAISAL, PILOT TESTS, AND DEVELOPMENT

A Holistic Corporate Approach to Unleash Hydrocarbon Potential from Unconventional Resources in Kuwait.....	2725
<i>Mohammad Al-Bahar, Vandana Suresh, Nejoud Al-Ostad, Abrar Al-Najjar</i>	
Electrifying the Permian Basin.....	2734
<i>Curtis Smith, Min Rao</i>	
Integrated Completions Analytics Through Automated Real-Time Activity Detection During Fracturing and Wireline Operations.....	2748
<i>Berk Coskuner, Mohammadreza Kamyab, Sai Sharan Yalamarty, Pavan Dharwadkar, Nader Khashab, Ryan Schick, Michael Lowder</i>	
Identification and Quantification of the Effect of Fracture-Driven Interactions on Production from Parent and Child Wells in Williston Basin.....	2762
<i>Abdeldjalil Latrach, Ahmed Merzoug, Cilia Abdelhamid, Ilyas Mellal, Minou Rabiei</i>	

THEME 2: ADVANCED FORMATION EVALUATION

Dielectric Response Interpretation of Source Rocks	2776
<i>Jose Benavides, Michael Myers, Lory Hathon</i>	
Integrated Petrophysical Characterization of Hydrocarbon Shale Unconventional Reservoirs Using a Rock Typing Approach, Case Study, Vaca Muerta Play, Neuquén Basin, Argentina.....	2792
<i>Rafael Panesso, Alfonso Quaglia, Guillermo Alzate, Juan Porras</i>	

VOLUME 5

- A Novel Method for Evaluating the Shale Oil Movability in Laboratory by Using High-Field NMR and Sequential Extraction..... 2812
Longhui Bai, Bo Liu, Z. Harry Xie

THEME 3: GEOLOGICAL CHARACTERIZATION AND EVALUATION SPANNING THE E&P LIFECYCLE

- Hidden Success of Unconventional Oil Play Behind Robust Integration of Subsurface G&G Data. a Case Study of Shilaif Unconventional Oil Play, Abu Dhabi, UAE 2823
Amena Alharthi, Muhammad Baig, Pierre Van Laer, Hassan Al Marzooqi, Abdulla Al Hashmi, Trevor Brooks, Amer Al Bannay, Abdullah Al Blooshi, Mohammed Al Braiki

- Key Drivers for Complexity of Hydraulic Fracture Stimulation - Cemented and Bitumen-Filled Fractures Formed During Hydrocarbon Maturation of the Marcellus Shale - Key Drivers to Complexity of Hydraulic Fracture Stimulation 2839
Timothy Carr, Natalie A. Mitchell, Ebrahim Fathi, Brian Panetta, B. J. Carney

- Using a Drill Cuttings-Based Approach to Predict Reservoir Performance for Improved Well Optimization. a Case Study from the Harkey Mills Sand and 2nd Bone Springs Sand, Bone Spring Formation, Lea County, New Mexico, USA 2859
John Speight, Guy M. Oliver, Isaac Easow

- Basin-Specific Optimization of an Automated Geosteering Algorithm Using Simulated Stratigraphy 2876
Kenneth McCarthy, Andrew Pare, Levi Heintzelman, Marc Willerth, Alexander Mitkus, Tannor Ziehm, Timothy Gee, Paul Reynerson

THEME 4: GEOPHYSICAL RESERVOIR ANALYSIS

- Exploring La Luna Formation Unconventional Plays in the Maracaibo Lake Basin, Through 3D Modeling Based on Acoustic Seismic Inversion 2891
Jose Mendez, Carlos Lobo, Ronny Movil, Carlos Alcantara, Luis Yegres, James Brown

- Validation Conductive Fracture Imaging with Cross Well Strain and Permanent Fiber Optic Flow Profiling..... 2902
Scott Taylor, Anton Reshetnikov, Anna Nazarova

- Characterizing Multiple Formations for Gas Production and CO2 Sequestration..... 2929
Adriana Gordon, Bill Goodway, Evan Mutual, Raul Cova, Scott Leaney, Wendell Pardasie, Matt Ng

THEME 5: GEOMECHANICS – THE INTERSECTION OF GEOSCIENCE AND ENGINEERING

- Advanced Dual-Porosity and Dual-Permeability Model for Tight Rock Integrated Primary Depletion and Enhanced Oil Recovery Simulation 2935
Daegil Yang, Tyler Do, Changdong Yang, Hao Sun, Keith Ramsaran, Xundan Shi, Dengen Zhou, Jianping Chen, Mathis Lee

- Supercritical CO2 and Water Injection Induced Fracturing - Application to Geological Carbon Sequestration 2951
Blessed C. A. Amoah, Son T. Dang, Chandra S. Rai, Carl H. Sondergeld

Quantifying Variability in Hydraulic Fracture Geometry Using Stage-By-Stage ISIP Analysis in Geomechanically Heterogeneous Rocks	2963
<i>Erfan Sarvaramini</i>	
Utilizing Geochemical, Petrophysical, and Geomechanical Analysis to Optimize Stimulation Design in Pimienta Formation.....	2987
<i>Douglas J. Betancourt, Claudio Rabe, Omer Iqbal, Jesus P. Salazar, Besmir Hoxha</i>	
Understanding the Drivers of Parent-Child Depletion: A Machine Learning Approach	3003
<i>Dillon Niederhut, Alexander Cui</i>	
Improving Well Productivity Using Water-Less Frac Fluids in Eagle Ford Shale Formation	3014
<i>Fatick Nath</i>	
The Effect of Variations of Fluid Pressure in Natural Fractures on the Geometry of Fracture Networks and Well Productivity.....	3029
<i>Meng Cao, Mukul M. Sharma</i>	
An Efficient Eulerian-Lagrangian Proppant Transport Model Coupled with Three-Dimensional Hydraulic Fracture Propagation.....	3041
<i>Shaowen Mao, Kan Wu, George Moridis</i>	
Inverse Approach to Development Optimizations to Calibrate Assumptions About Trade-Off's Between Well Spacing and Frac' Intensity	3054
<i>W. Kurt Rucker</i>	
Simulation of the Seismic Records (DAS) in a Borehole Throughout CO2 Storage Procedures	3064
<i>José Pulido, Yiyu Ni</i>	
Core Data Integration/ Validation of Sonic Derived Anisotropic Mechanical Properties to Expedite Well Decisions in Unconventional Reservoirs	3070
<i>Edgar Velez, Kevin Fisher</i>	

THEME 6: SUBSURFACE GEOCHEMISTRY INCLUDING ROCK-FLUID AND FLUID-FLUID INTERACTIONS

Gas Hydrate Structure Evolution Revealed by Coarsening Molecular Dynamics Simulation	3082
<i>Hao Xiong, Hao Liu, Jing Fu</i>	
Producible Fluid Oil and Biogenic Gas Saturations of the Upper Cretaceous Unconventional Carbonate Plays, Northern Arabian Plate of Turkey.....	3094
<i>Samil Sen, Berat Barslan</i>	
A Statistical Look at Drainage Behavior and Its Controls in Unconventional Reservoirs - A Multi-Basin Study.....	3103
<i>Shuangyu Ge, Muqing Jin, Tao Lv, Jana Bachleda, Yuchen Liu, Jiang Wu, Faye Liu</i>	
Effect of Hydrogen Exposure on Shale Reservoir Properties: A Thorough Experimental Study Evaluating Interaction of Hydrogen with Rock and Fluid When Exploring Storage Potential	3123
<i>Elie Bechara, Talal Gamadi, Sugan Raj Thiyagarajan, Athar Hussain, Hossein Emadi, Ion Ispas, Cecil Millikan</i>	
Impact of Fracture Roughness on Fines Migration and Fracture Aperture Growth in Calcareous Shale Rocks During Acidized Core Floods	3132
<i>Hasan J. Khan, Ridha Al-Abdulrabalnabi, Murtada S. Al-Jawad</i>	

THEME 7: APPLICATIONS OF DATA SCIENCE

Application of Data Analytics to Chemometric Analysis of Conventionally Produced Oil Samples from the Delaware Basin.....	3143
<i>Timothy Carpp, Julia Reece, Mauro Becker, Siddharth Misra</i>	
Auto-Identification and Real-Time Warning Method of Multiple Type Events During Multistage Horizontal Well Fracturing.....	3163
<i>Mingze Zhao, Yue Li, Yuyang Liu, Bin Yuan, Siwei Meng, Wei Zhang, He Liu</i>	
Machine Learning Based Stereoscopic Triple Sweet Spot Evaluation Method for Shale Reservoirs	3181
<i>Yuxuan Deng, Wendong Wang, Xianfei Du, Yuliang Su, Shibo Sun, Yan Zhang, Jiancheng Teng</i>	
A Shapley Approach to Permian Rock Quality	3194
<i>Emily Head, Stephen Sagriff, Stephen Pratt, Brad Bernard</i>	
Rock Thin-Section Analysis and Mineral Detection Utilizing Deep Learning Approach	3201
<i>Fatick Nath, Sarker Asish, Shaon Sutradhar, Zhiyang Li, Nazmul Shahadat, Happy R. Debi, S. M. Shamsul Hoque</i>	
Production Sweet Spots of Eight US Shale Plays Constrained by Data Analytics of Normalized Production Index, Payzone Depth, and Initial GOR.....	3212
<i>Rasoul Sorkhabi, Palash Panja, Milind Deo</i>	
Machine Learning Based Approach to Optimize Huff-N-Puff Gas Injection in Naturally Fractured Shale Oil Reservoirs	3225
<i>Khaled Enab</i>	

THEME 8: UNLOCKING THE PRODUCTION AND RECOVERY POTENTIAL

Fracturing Fluid Chemistry and Job Placement Design Optimized for Formation Skin Damage Reduction Improves Well Performance: A Permian Midland Basin Case Study.....	3238
<i>John Blevins, Timothy C. Svarczkopf, Kira Demitrus, Jordan Gist</i>	
Tailored Metal Oxide Nanoparticles-Based Fluids in Acid Restimulation Treatments Reverses Long-Term Hydrocarbon Decline: A Pilot Study in Wolfcamp (A) Formation.....	3258
<i>Panagiotis Dalamarinis, Amr Radwan, Raja Ramanathan, Abdulaziz Ellafi, Suman Khanal</i>	
Water-Intake Profile Analysis for the First Ever Polymer Flooding to Heavy Oils on Alaska's North Slope for Potential of Improved Recovery	3270
<i>Dongmei Wang, Shane Namie, Randy Seright</i>	
New Rapid Solutions for Production Analysis from Multi Transverse Fracture Wells	3290
<i>Ismail S. Mohamed, Venkata Bala Krishnateja Chavali, Michael J. King</i>	
Effect of Gas-Liquid Anomalous Diffusion on Production Behavior and Pressure and Rate Transient Responses in Unconventional Reservoirs.....	3309
<i>Gizem Yildirim, Erdal Ozkan</i>	
Does Liquid Slip Flow Occur in Unconventional Reservoir Rocks? a Laboratory Study of Liquid Permeability.....	3323
<i>Sheng Peng</i>	

Nano-Surfactant Packages for Enhanced Oil and Gas Recovery in Hydraulic Fracturing-Impact on the Nano-Sizers on the Performance of Conventional Surfactants	3339
<i>Sarkis Kakadjian, Amanda Flowers, Jarrett Kitchen, Amanuel Gebrekirstos, Kristopher Boyd, Otman Algadi</i>	
Case Study of Gas Injection and EOR Potential in Unconventional Marginal Permian Horizontal Wells	3349
<i>Sandarbh Gautam, Birol Dindoruk, Ed Behm, Chad Roller</i>	
Enhancing Surface Production Measurements and Simplifying Field Architecture with Multiphase Flowmeters in the Permian and Eagle Ford Shale	3375
<i>Katharine Moncada, Liviu Husoschi, Bertrand Theuveny</i>	
Oil Recovery Performance and Asphaltene Deposition Evaluation of Miscible and Immiscible Carbon Dioxide Or Nitrogen Huff-N-Puff Processes in Shale Reservoirs	3385
<i>Mukhtar Elturki, Abdulmohsin Imqam, Shari Dunn-Norman, Hasan Shaglouf, Ahmed Kablan</i>	
From Laboratory to Field: Simulation of a Surfactant Huff-N-Puff Pilot in the Eagle Ford	3394
<i>Jingjing Zhang, Isaiah Ataceri, Eduardo Gildin, David Schechter, Hadi Nasrabadi</i>	
Novel High-Pressure-High-Temperature Setup for Surfactant-Assisted Spontaneous Imbibition	3413
<i>Mohammad H. Elkady, Isaiah Z. Ataceri, David S. Schechter</i>	

THEME 9: RESERVES ESTIMATION AND PRODUCTION FORECASTING

Multi-Regression Modeling Approach for Choke Performance and Production Analysis	3424
<i>Mario Vicente, Raúl Belkenoff</i>	
Optimization Method for Fracture-Network Design Under Transient and Pseudosteady Condition Using UFD Technique and Deep Learning Approach	3449
<i>Junlei Wang, Yunsheng Wei, Yuewei Pan, Wei Yu</i>	
Studies on Influential Factors of Flowback and Productivity of MFHWs and a Field Case in Shale Gas Formations.....	3466
<i>Guicheng Jing, Zhangxin Chen</i>	

THEME 9: RESERVES IMPLICATIONS AND TYPE WELL PROFILES

A New Approach to Apply Decline-Curve Analysis for Tight-Oil Reservoirs Producing Under Variable Pressure Conditions.....	3482
<i>Leopoldo M. Ruiz Maraggi, Mark P. Walsh, Larry W. Lake</i>	

Author Index