Integrated Geology of Unconventionals: The Case of the Vaca Muerta Play, Argentina

AAPG Memoir 121

Edited by
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and Héctor A.Leanza

Published by
The American Association of Petroleum Geologists (AAPG)
Tulsa, Oklahoma USA

Printed in the USA

ISBN: 9780891814269

AAPG Editor: Dr. Robert J. Merrill
AAPG Technical Publications Managing Editor: Beverly K. Molyneux

On the Cover:

FRONT: Outcrop of the Vaca Muerta Formation showing the typical organic-rich facies and stratigraphy, analogs of the subsurface landing zones (outcrop is ca. 20 × 60 m).
BACK: Seismic section along the entire Neuquén Basin showing the clinoforms of the Vaca Muerta-Quintuco systems, 230 km long, 900 m thick (modified from Sattler, F., R. F. Domínguez, M. Fantín, P. Desjardins, H. Reijenstein, A. Bande, M. Borgnia, F. González-Tomassini, F. Vittore, E. Fenstein, D. Kietzmann, and D. Marchal, 2018, Enclosure 1: Regional cross-section A-A', *in* G. González, M. D. Vallejo, D. Kietzmann, D. Marchal, P. Desjardins, F. González Tomassini, L. Gómez Rivarola, and R. F. Domínguez, eds., Regional cross section of the Vaca Muerta Formation: Integration of seismic, well logs, cores and outcrops: Special Publication of Instituto Argentino del Petróleo y del Gas, Buenos Aires, Argentina, p. 245).

This publication is available in hard copy from:

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Phone: 1-918-584-2555
E-mail: CECInbox@aapg.org
www.aapg.org
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Geological Society Publishing House
Unit 7, Brassmill Enterprise Centre
Brassmill Lane, Bath BA13JN
United Kingdom
Phone: +44-1225-445046
E-mail: sales@geolsoc.org.uk
www.geolsoc.org.uk

Financial Acknowledgments

AAPG wishes to thank the following for their generous contributions to AAPG Memoir 121 Integrated Geology of Unconventionals: The Case of the Vaca Muerta Play, Argentina

miniGeology

Asociación Argentina de Geólogos y Geofísicos Petroleros (AAGGP)

Contributions are applied toward the production cost of the publication, thus directly reducing the book's purchase price and making the volume available to a larger readership.

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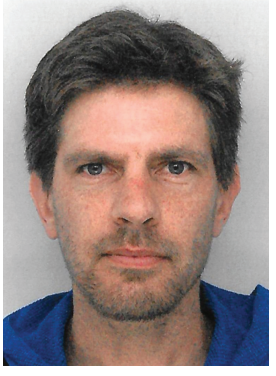
About the Editors

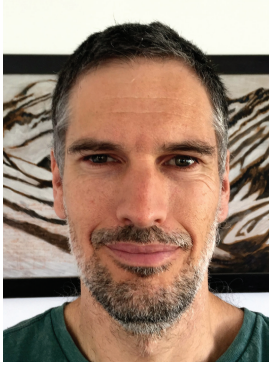
Daniel Minisini

Daniel is an explorer at Shell, specialized in stratigraphy and sedimentology. Daniel was part of the team that allowed Shell to enter the Vaca Muerta play. Daniel is a passionate, focused, and rigorous integrator of the several geological subdisciplines that allow understanding of how the complex systems of the past worked. Daniel earned his Ph.D. in marine geology from the Universitá di Bologna, spending several months on research vessels. He then worked at the Geophysical Department of Eni before landing at the Shell Technological Center in Houston. During his career, he has investigated the foundations of the unconventional reservoirs through the integration of seismic interpretation, field campaigns, modern analogs, and lab experiments, from hand samples to basin scale. He has published 45 peer-reviewed articles. Daniel was born in Spain, raised in Italy, and matured in Houston (Texas). He is currently exploring new ventures around the world to uncover new resources while learning how to better act for the benefit of the community within the present complex energy industry. Daniel is also adjunct professor at Rice University, host of the radio program *miniGeology*, marathon runner, and volunteer with *The Prison Show* where he fights to abolish the death penalty.



Manuel Fantín

Manuel is an Argentinian geologist dedicated to the dark side of the petroleum geology, the shale plays. He has been involved since the early stages in the evaluation of the Vaca Muerta play, supporting new business development (acreage acquisition and assets prioritization), designing exploratory programs (well locations strategy, data gathering plans, operations follow-up), and analyzing multisource data (outcrops, cores, e-logs, seismic, microseismic, production). He has been a catalyst in several joint projects that linked the strengths of academia and industry. Manuel earned a B.Sc. in geology from the Universidad de Buenos Aires in 2003. He started his career in the oil and gas industry as a seismic interpreter in Landmark Graphics, and he moved to Chevron in 2006. When the geology of Vaca Muerta aroused international interest, he became a pivot between this world-class source rock and one of the first majors focusing on the Neuquén Basin. As with many other colleagues, he evolved into a multitask "unconventional" geologist, dealing with regional frameworks, petrophysical and geomechanical parameters, laboratory analysis, landing zones, completion designs, scouting, consortiums, and resource evaluations. Manuel collaborated in the exploration and early development of Vaca Muerta projects, from black oil to dry gas maturity windows, working for Chevron, Pan American Energy, and TOTAL. His current research interests include the understanding of geological drivers that improve the production and environmental performance of unconventional plays.



Iván Lanusse Noguera

Iván is an Argentinian geologist who graduated from Universidad de Buenos Aires with 16 years of experience in the oil and gas industry. Iván developed his skills in YPF, the main Argentinian energy company, from technical positions to leadership responsibilities in the most recent years. When working as a young professional, he contributed as exploration and development geologist for diverse conventional projects, from fold-and-thrust belt regional projects in the northwestern region of the Neuquén Basin, to operational field experience, and to the development of oil and gas fields associated with siliciclastic and volcaniclastic reservoirs (Precuyano, Los Molles, Lajas, Lotena, Sierras Blancas) in structural and stratigraphic traps around the Huincul High. Over the last decade, he has been involved in unconventional exploration, delineation, and development of projects in the Vaca Muerta play (in the leasing blocks of Loma Campana, Bandurria, La Amarga Chica, Bajo del Toro, Narambuena, Loma Amarilla, Bajada de Añelo, Loma La Lata) and in the study of source rocks (Los Molles, Agrio, Cacheuta, D-129, Anticlinal Aguada Bandera, Inoceramus–Margas Verdes) in the main productive basins in Argentina. Today, as subsurface team lead of the "Loma Campana" block, he is challenged to define the most efficient development strategies in the Vaca Muerta play.

Héctor A. Leanza

Héctor is a primary protagonist of the Vaca Muerta and Neuquén Basin scientific history. He dedicated five decades to the research, understanding, and outreach of the Vaca Muerta geology while mentoring numerous generations of geologists. His main professional expertise includes regional geology, paleontology, and sedimentology. He earned his Ph.D. in Geological Sciences at the National University of Córdoba (Argentina) in 1972. He initially worked on phosphate geology and biostratigraphy of the Jurassic–Cretaceous boundary in the Neuquén Basin, publishing studies that earned him worldwide recognition. As member of the Argentinian Geological Survey (SEGEMAR), he contributed with the mapping of more than 120,000 km^2 in the central western Argentina. During his career in the Argentinian Research Council (CONICET) he published 250 articles and he was editor and reviewer of numerous scientific contributions, including the book "Geology and Natural Resources of Neuquén Province." He also taught Historical Geology as professor at National University of La Plata. Currently, he works at the Argentinian Museum of Natural Sciences (MACN) in Buenos Aires. Héctor was President of the Argentinian Geological Association (AGA) and the Argentinian Paleontological Association (APA). He is member of the National Academy of Sciences, and fellow of the Alexander von Humbolt and the Guggenheim Foundations. Among other distinctions, he obtained the Konex Prize in 2003, the Pablo Groeber Prize from the Argentinian Academy of Sciences in 2004, the Diploma of Recognition from the Argentinian Chamber of Deputies in 2005, and the Golden Insignia from CONICET in 2008. In 2019 Héctor was awarded the Strobel Prize, one of Argentina's first science awards, for his contribution to geology.

Acknowledgments

The editors greatly acknowledge the time, dedication, insights, and care of the reviewers who clearly enhanced the quality of this contribution.

Bill Derschowitz (GeoFractal LLC)
Bill Von Gonten (WDVG & Co.)
Bob Mitchum (Chevron; retired)
Brooke Carson (Chevron)
Carlo Doglioni (INGV)
Carlos Arregui (Pampa Energia; retired)
Carlos Macellari (Tecpetrol)
Casey Donohue (Apache)
Catie Stachura Donohue (GeoMark)
Chandler Wilhelm (Shell)
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