

COLIN M. SAYERS, Ph.D.

Geomechanics, Geophysics and Rock Physics for Geoscience and Engineering

SUMMARY

Geoscientist with expertise in Geomechanics, Geophysics and Rock Physics. Entered the oil industry to join Shell's Exploration and Production Laboratory in Rijswijk, The Netherlands in 1986, and moved to Schlumberger in 1991, finally becoming Scientific Advisor in the Schlumberger WesternGeco North America Land Multiclient Seismic Group in Houston. Extensive experience in rock physics, unconventional and fractured reservoirs, borehole/seismic integration, stress-dependent acoustics, advanced sonic logging, reservoir geomechanics, analysis of production-induced reservoir stress changes, subsidence, fault reactivation, 3D mechanical earth modeling, fractured reservoir evaluation, pore pressure prediction, wellbore stability analysis, rock mechanics, seismic anisotropy, reflection amplitude variation with offset and azimuth (AVOA), and fluid flow in fractured reservoirs. Member of the AGU, APS, EAGE, GSH, SEG, and SPE, a member of the Research Committee of the SEG, and served on the editorial boards of the *International Journal of Rock Mechanics and Mining Science*, *Geophysical Prospecting*, and *The Leading Edge*. B.A. (1st Class Honors) in Physics from the University of Lancaster, U. K. and D.I.C. and Ph.D. in Physics from Imperial College, London, U.K. Presented the SEG/EAGE Distinguished Instructor Short Course "Geophysics under stress: Geomechanical applications of seismic and borehole acoustic waves." Awarded Honorary Membership of the Geophysical Society of Houston (GSH) in 2013 "In Recognition and Appreciation of Distinguished Contributions to the Geophysical Profession". 2013 Best Paper in The Leading Edge, Society of Exploration Geophysicists.

PROFESSIONAL EXPERIENCE

June 2020 – Present: Research Professor, Department of Earth and Atmospheric Sciences, University of Houston.

July 2012 – May 2020: Scientific Advisor, Schlumberger WesternGeco North America Land Multiclient Seismic Group, Houston. Unconventional reservoirs, seismic solutions, rock physics, 3D Mechanical Earth Model, reservoir geomechanics, fractured reservoirs.

September 2003 – June 2012: Scientific Advisor, Schlumberger Data & Consulting Services Geomechanics Group, Houston. Rock physics, geophysics, 3D Mechanical Earth Model, reservoir geomechanics, analysis of production-induced reservoir stress changes, sanding, subsidence, fault reactivation, prediction of pore pressure, wellbore stability and drilling hazards for safe and economic drilling, and analysis of unconventional and fractured reservoirs.

September 2002 - August 2003: Principal Geoscientist, Shell UK E&P, Aberdeen. Focal point within Shell Expro for pore pressure prediction, geomechanics and the integration

of Geology and Geophysics with well engineering. Projects included integration of geology and geophysics with well engineering, drilling hazard prediction, time-lapse seismology, rock physics, AVO, evaluation of fractured reservoirs and prediction of pore pressure in HPHT reservoirs and borehole/seismic integration.

2000-2002: Principal Geophysicist, Schlumberger Data & Consultancy Services. Projects included pore pressure, fracture gradient and drilling hazard prediction, fractured reservoir evaluation and borehole/seismic integration. Geophysical Advisor to Schlumberger's Deep-Water Center of Excellence.

1998-2000: Principal Geophysicist, North and South America Marketing and Geophysical Support Department, Schlumberger Reservoir Evaluation Seismic. Provided expert geophysical consultancy to the Geophysical Solutions groups and developed client focused products in collaboration with Research and Engineering. Work included seismic forward modeling, 4D seismology, seismic pore pressure and drilling hazard prediction, point receiver seismology, fractured reservoir evaluation, borehole/seismic integration, 4C seismology, seismic anisotropy and wide-offset processing.

1991-1998: Senior Research Scientist, Schlumberger Cambridge Research. Program leader for Seismic Reservoir Characterization and Monitoring. Research included work on time-lapse seismic, seismic reservoir characterization, mode-converted shear waves recorded at the seafloor, multi-offset and multi-azimuth VSPs, AVO, seismic travel-time inversion, anisotropic velocity analysis, non-hyperbolic moveout in azimuthally anisotropic media, anisotropic DMO, characterization of fractured reservoirs, petrophysical properties of shales and shaley sands and the characterization of oilfield cements using ultrasound.

1990 - 1991: Head of the Non-Metallic Engineering Department, Shell Research Arnhem.

1986 - 1990: Research position in Geomechanics section of the General Research Department of the Koninklijke/Shell Exploratie en Productie Laboratorium, Rijswijk, The Netherlands. Research included: Microcrack-induced seismic anisotropy of sedimentary rocks, theoretical and numerical studies of stress interactions in multiply fractured rocks, in-situ stress determination from measurements on cores, fluid flow in naturally fractured reservoirs, rock mechanics and studies of the rock-bit interaction. The work supported research projects in other departments including Rock Mechanics, Petrophysics, Geophysics, Structural Geology, Drilling and Reservoir Engineering.

1978 - 1986: Appointed as Higher Scientific Officer in Materials Physics and Metallurgy Department, Atomic Energy Establishment, Harwell. Promoted to Senior Scientific Officer 1/7/80. Promoted to Principal Scientific Officer 1/7/85. The work involved providing theoretical support for the Materials Physics and Metallurgy Division at Harwell, for the Non-Destructive Testing Centre and the Materials Characterization Group in close collaboration with experimentalists. The main areas of work included: Residual stress determination using ultrasound, thermography, ultrasonic propagation in

inhomogeneous materials, catalyst characterization and metallurgical studies with neutrons.

1976 - 1978: Imperial College, University of London. Research Fellow of Science Research Council. Theory of electronic structure of transition metals.

1973: Atomic Energy Establishment, Harwell. Vacation Student. Generalization of work performed in Summer 1972 to the case of general anisotropy and the calculation of the neutron scattering cross-section.

1972: Atomic Energy Establishment, Harwell. Vacation Student. Spin Wave analysis of Type II FCC antiferromagnets, the finished work being submitted to the University of Lancaster in partial fulfilment of the requirements of the B.A. degree.

1970: Pilkington's Research and Development Laboratories, Lathom. Vacation Student in Combustion Engineering Group of Melting Technology Division. Worked on design of regenerators for maximum efficiency of glass furnaces and the study of heat losses.

EDUCATION

1973-1976: Imperial College, University of London. Distinction in 1974 D.I.C. examination (Diploma of Imperial College) in Theoretical Physics. Awarded Ph.D. in 1976. Thesis title: Correlation effects in the transition metals and the screening of non-transition metal impurities in iron and nickel.

1970-1973: Lancaster University. Awarded 1st Class Honours degree in Physics and William Pickles prize as best graduate in Physics in 1973.

PROFESSIONAL QUALIFICATIONS AND AFFILIATIONS

Member of the American Geophysical Union (AGU), European Association of Geoscientists and Engineers (EAGE), Geophysical Society of Houston (GSH), Houston Geological Society (HGS), Society of Exploration Geophysicists (SEG) and the Society of Petroleum Engineers (SPE). Member of the Research Committee of the SEG. Served on the editorial board of the following journals: Geophysical Prospecting, International Journal of Rock Mechanics and Mining Science, The Leading Edge.

AWARDS

Conrad Schlumberger Award for "Outstanding Paper for Technical Depth" for the paper "Prediction of reservoir pore pressure, compaction, casing deformation and surface

subsidence using a 3D Mechanical Earth Model" presented at the Schlumberger Reservoir Symposium in 2004.

Conrad Schlumberger Award for "Outstanding Paper for Technical Depth" for the paper "Gulf of Mexico Wide Pore Pressure Cube" presented at the Schlumberger Reservoir Symposium in 2005.

2005 Schlumberger D&M President's award.

First place in the 2007 North Gulf Coast Symposium for the paper "Pore Pressure Prediction as a Multi-client Product in the Gulf of Mexico: Pore Pressure Prediction for E-Dragon".

First place in the 2008 Schlumberger North Gulf Coast Symposium and North America Symposium for the paper "Determination of rock strength and in-situ stress using Sonic Scanner data".

2009 Schlumberger Data & Consulting Services President's Award.

2010 SEG/EAGE Distinguished Short Course Instructor.

2013. Honorary Member of the Geophysical Society of Houston (GSH) "In Recognition and Appreciation of Distinguished Contributions to the Geophysical Profession".

2013 Best Paper in The Leading Edge, Society of Exploration Geophysicists.

PATENTS

United States Patent 10,816,686 "Seismic constrained discrete fracture network" by Lennert D. den Boer and Colin M. Sayers, October 27, 2020

United States Patent 10,444,389 "Determining change in permeability caused by a hydraulic fracture in reservoirs" by Colin M. Sayers and Lennert D. den Boer, October 15, 2019

United States Patent 9,238,962 "Pore pressure from spectroscopy and sonic data" by Alexis S. Husser, Colin M. Sayers, Aron Kramer, John P. Horkowitz and Geoff Weller, Jan 19, 2016

United States Patent 8,781,806 "Determining elastic and fluid flow properties of a fractured reservoir" by Lennert D. den Boer and Colin M. Sayers, July 15, 2014

United States Patent 8,780,671 "Using microseismic data to characterize hydraulic fractures" by Colin M. Sayers, July 15, 2014

United States Patent 8,447,579 "Method and system for pore pressure prediction" by Colin M. Sayers and Lennert D. den Boer, May 21, 2013

United States Patent 8,341,984 "Estimating velocities with uncertainty" by Ran Bachrach, Konstantin Osypov and Colin M. Sayers, January 1, 2013

United States Patent 8,243,549 "Estimating seismic anisotropy of shales" by Colin M. Sayers, August 14, 2012

United States Patent 8,024,124 "Determining maximum horizontal stress in an earth formation" by Colin M. Sayers, September 20, 2011

United States Patent 7,996,199 "Method and system for pore pressure prediction" by Colin M. Sayers and Lennert D. den Boer, August 9, 2011

United States Patent 7,869,954 "Using microseismic data to characterize hydraulic fractures" by Lennert D. den Boer and Colin M. Sayers, January 11, 2011

United States Patent 7,679,993 "Method of characterizing a fractured reservoir using seismic reflection amplitudes" by Colin M. Sayers, March 16, 2010

United States Patent 7,653,488 "Determination of point of sand production initiation in wellbores using residual deformation characteristics and real time monitoring of sand production" by Ali I. Mese, Colin M. Sayers, Robert A. Holicek, Dan Shan, Donald W. Lee and Jorge Aurelio Santa Cruz Pastor, January 26, 2010

United States Patent 7,617,051 "Method and system for pre-drill pore pressure prediction" by Colin M. Sayers and Richard A. Birchwood, November 10, 2009

United States Patent 7,533,725 "Method and system for altering pore pressure in a fracturing operation " by Ali I. Mese, Colin M. Sayers, Donald W. Lee and Patrick J. Hooyman, May 19, 2009

United States Patent 7,526,385 "Method, system and apparatus for determining rock strength using sonic logging" by Colin M. Sayers, April 28, 2009

United States Patent 7,486,589 "Methods and apparatus for predicting the hydrocarbon production of a well location" by Donald W. Lee, Lennert D. den Boer, Colin M. Sayers and Patrick J. Hooyman, February 3, 2009

United States Patent 7,299,132 "Method and system for pre-drill pore pressure prediction" by Colin M. Sayers and Richard A. Birchwood, November 20, 2007

United States Patent 6,714,480 "Determination of anisotropic moduli of earth formations" by Bikash K. Sinha, Colin M. Sayers and Takeshi Endo, March 30, 2004

United States Patent 6,067,275 "Method of analyzing pre-stack seismic data" by Colin M. Sayers, May 23, 2000

PUBLICATIONS

Sayers, C.M., 2023. The effect of clay and contacts between sand grains on the elastic properties of sandstones. *Geophysical Prospecting*, 71(3), 456-470.

Sayers, C.M., 2023. Elastic wave velocities in a granitic geothermal reservoir. *Geophysical Prospecting*, 71(1), pp.114-124.

Sayers, C.M., 2022. Elastic anisotropy of the Marcellus Shale. *Geophysical Prospecting*, 70(2), 237-245.

Sayers, C.M., 2022. Elastic properties of fractures in transversely isotropic media. *Journal of Applied Geophysics*, 197, 104527.

Sayers, C.M., 2022. Elastic frame moduli in a sandstone reservoir used for underground CO₂ storage. In *Second International Meeting for Applied Geoscience & Energy* (pp. 2303-2307). Society of Exploration Geophysicists and American Association of Petroleum Geologists.

Thomsen, L. and Sayers, C., 2022. Anisotropy parameters for fractured shales. In *Second International Meeting for Applied Geoscience & Energy* (pp. 150-154). Society of Exploration Geophysicists and American Association of Petroleum Geologists.

Sayers, C.M. and den Boer, L.D., 2021. Porosity variation of elastic wave velocities in clean sandstones. *Geophysical Prospecting*, 69(8-9), 1733-1744.

Sayers, C.M., 2021. Mechanical properties of grain contacts in unconsolidated sands. *Geophysics*, 86(2), MR95-MR103.

Paris, A.G., Stewart, R.R., and Sayers, C.M., 2021, October. Seismic petrophysics applied to the Bakken Formation, North Dakota. In *SEG/AAPG/SEPM First International Meeting for Applied Geoscience & Energy*. OnePetro.

Sayers, C.M. and den Boer, L.D., 2021, September. The effect of spatial distribution of clay platelets on the anisotropy of clay in shales. In *First International Meeting for Applied Geoscience & Energy* (2263-2267). Society of Exploration Geophysicists.

Sayers, C.M., 2021. Porosity dependence of elastic moduli of snow and firn. *Journal of Glaciology*, 67(265), 788-796.

Sayers, C.M., 2021. Contribution of crystal orientation and grain boundary compliance to low shear velocity observed near base of polar ice sheets. *Geophysical Journal International*, 227(3), 1554-1566.

Lynn, H., Sayers, C.M. and Roure, B., 2021. The SEAM Barrett model: Strengths and weaknesses. *Geophysics*, 86(5), M177-M183.

Sayers, C.M. and den Boer, L.D., 2020. Effect of variations in microstructure on clay elastic anisotropy. *Geophysics*, 85(2), MR73-MR82.

Sayers, C.M., Koesoemadinata, A., Dasgupta, S., Sudhakar, V. and Hearn, R., 2020, October. Predicting drilling performance in unconventional reservoirs using seismic inversion. In *SEG International Exposition and Annual Meeting*. OnePetro.

Hootman, B.W., Gofer, E., Leaney, S. and Sayers, C.M., 2020. Orthorhombic analysis of the SEAM Phase II model. In *SEG Technical Program Expanded Abstracts 2020* (pp. 141-145). Society of Exploration Geophysicists.

Sayers, C.M. and den Boer, L.D., 2020. Fracture characterization from seismic data in the presence of multiple vertical fracture sets. In *SEG Technical Program Expanded Abstracts 2020* (pp. 2206-2210). Society of Exploration Geophysicists.

Sayers, C.M., Dasgupta, S., Koesoemadinata, A. and Shoemaker, M., 2019. ROCK PHYSICS OF THE WOLFCAMP FORMATION, DELAWARE BASIN. *Geophysics*, 84(6), pp.1-41.

Sayers, C.M. and den Boer, L.D., 2019. The impact of different clay minerals on the anisotropy of clay matrix in shale. *Geophysical Prospecting*, 67(9), pp.2298-2318.

Sayers, C.M., Dasgupta, S., den Boer, L.D., Gofer, E., Lascano, M., Paddock, D., Sudhakar, V. and Walz, A., 2019. Seismic inversion for engineering applications in unconventional reservoirs. In *SEG Technical Program Expanded Abstracts 2019* (pp. 4740-4744). Society of Exploration Geophysicists.

Sayers, C.M., den Boer, L.D., Koesoemadinata, A., Gofer, E. and Shoemaker, M., 2019. Fracture characterization in the Delaware Basin using wide-azimuth seismic data. In *SEG Technical Program Expanded Abstracts 2019* (pp. 3225-3229). Society of Exploration Geophysicists.

Sayers, C.M. and Dasgupta, S., 2019. A predictive anisotropic rock-physics model for estimating elastic rock properties of unconventional shale reservoirs. *The Leading Edge*, 38(5), pp.358-365.

Sayers, C.M. and den Boer, L.D., 2019. Elastic anisotropy of clay in shales. In *SEG Technical Program Expanded Abstracts 2019* (pp. 3528-3532). Society of Exploration Geophysicists.

den Boer, L.D. and Sayers, C.M., 2018. Constructing a discrete fracture network constrained by seismic inversion data. *Geophysical Prospecting*, 66(1), pp.124-140.

Sayers, C.M. and Dasgupta, S., 2018. Rock physics of unconventional reservoirs. In SEG Technical Program Expanded Abstracts 2018 (pp. 3598-3602). Society of Exploration Geophysicists.

Sayers, C.M. and den Boer, L.D., 2018. The Elastic Properties of Clay in Shales. *Journal of Geophysical Research: Solid Earth*, 123(7), pp.5965-5974.

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Sayers, C.M., 2018. Increasing contribution of grain boundary compliance to polycrystalline ice elasticity as temperature increases. *Journal of Glaciology*, 64(246), pp.669-674.

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den Boer, L., Sayers, C., Gofer, E., Lascano, M., Walz, M., Dasgupta, S., Purdue, G. and Goodway, W., 2017. Characterization of fluid-flow anisotropy in a carbonate reservoir using AVAZ inversion of wide-azimuth seismic data. In SEG Technical Program Expanded Abstracts 2017 (pp. 3012-3016). Society of Exploration Geophysicists.

Sayers, C. and Dasgupta, S., 2017. Rock physics of the Wolfcamp formation, Delaware Basin. In SEG Technical Program Expanded Abstracts 2017 (pp. 3653-3659). Society of Exploration Geophysicists.

Sayers, C.M., 2017, November. Seismic Inversion for Engineering Applications in Unconventional Reservoirs. In First EAGE/AMGP/AMGE Latin-American Seminar in Unconventional Resources.

C.M. Sayers, M. Lascano, E. Gofer, L. Den Boer, M. Walz, A. Hannan, S. Dasgupta, W. Goodway, M. Perez and G. Purdue (2016) Geomechanical model for the Horn River Formation based on seismic AVA inversion, 86th SEG Annual Meeting, Expanded Abstracts.

R. Kumar, P. Bansal, B. Al-Mal, S. Dasgupta, C. Sayers, P. Ng, A. Hannan, E. Gofer, M. Walz and C. Wagner (2016) Orthotropic rock-physics based inversion for fracture and total organic carbon (TOC) characterization from azimuthal P-wave seismic survey: Case study from a northern Kuwait unconventional reservoir, 86th SEG Annual Meeting, Expanded Abstracts.

R. Kumar, T. Al-Mutairi, P. Bansal, S. Dasgupta, C. Sayers, P. Ng, A. Hannan, E. Gofer, C. Wagner, M. Walz (2016) Seismic data conditioning for AVOA analysis: Case study from a north Kuwait unconventional reservoir, 86th SEG Annual Meeting, Expanded Abstracts.

Sayers, C.M. and den Boer, L.D., 2016. The elastic anisotropy of clay minerals. *Geophysics*, 81(5), pp.C193-C203.

Ahmadi, M., Taleghani, A.D., and Sayers, C.M., 2016. The effects of roughness and offset on fracture compliance ratio. *Geophysical Supplements to the Monthly Notices of the Royal Astronomical Society*, 205(1), 454-463.

Sayers, C.M., Hirao, M. and Morishita, T., 2016. Grain boundary compliance and ultrasonic velocities in pure copper undergoing intergranular creep. *International Journal of Solids and Structures*, 96, 400-408.

Da Silva, J.A., and C.M. Sayers (2015) AVAZ interpretation using anisotropic rock physics, 85th SEG Annual Meeting, Expanded Abstracts.

Sayers, C.M., K. Fisher and J.J. Walsh (2015) Rock physics of the Eagle Ford Shale, 85th SEG Annual Meeting, Expanded Abstracts.

Sayers, C., L. den Boer, S. Dasgupta, and B. Goodway (2015) Anisotropy estimate for the Horn River Basin from sonic logs in vertical and deviated wells, *The Leading Edge*, 34, 296-306.

Sayers, C.M., S. Guo, and J. Silva (2015) Sensitivity of the elastic anisotropy and seismic reflection amplitude of the Eagle Ford Shale to the presence of kerogen, *Geophys. Prosp.* 63, 151-165.

Bachrach, R., C.M. Sayers, J Da Silva, and S. Dasgupta (2014) Recent advances in the characterization of unconventional reservoirs with wide-azimuth seismic data, 84th SEG Annual Meeting, Expanded Abstracts.

Sayers, C.M., J.J. Walsh, and K. Fisher (2014) Sonic anisotropy of the Lower Eagle Ford Shale, 84th SEG Annual Meeting, Expanded Abstracts.

Sayers, C.M., and L. den Boer (2014) Shale anisotropy and the elastic anisotropy of clay minerals, 84th SEG Annual Meeting, Expanded Abstracts.

Bachrach, R., C.M. Sayers, S. Dasgupta, and J da Silva (2014) Seismic reservoir characterization for unconventional reservoirs using orthorhombic AVAZ attributes and stochastic rock physics modeling, 84th SEG Annual Meeting, Expanded Abstracts.

Sayers, C.M., and S. Dasgupta (2014) Elastic anisotropy of the Middle Bakken formation, 84th SEG Annual Meeting, Expanded Abstracts.

Ahmadi, M., A. Dahi Taleghani, and Sayers, C.M. (2014) Direction dependence of fracture compliance induced by slickensides, *Geophysics*, 79, C91-C96.

Sayers, C.M. (2013) The effect of kerogen on the elastic anisotropy of organic-rich shales, *Geophysics*, 78, N1–N10.

Far, M.E., L. Thomsen, and C.M. Sayers (2013) Seismic characterization of reservoirs with asymmetric fractures, *Geophysics*, 78, D65–D74.

Sayers, C.M. (2013) The effect of anisotropy on the Young's moduli and Poisson's ratios of shales, *Geophys. Prosp.*, 61, 416–426.

Far, M.E., C.M. Sayers, L. Thomsen, D. Han, and J.P. Castagna (2013) Seismic characterization of naturally fractured reservoirs using amplitude versus offset and azimuth analysis, *Geophys. Prosp.*, 61, 427–447.

Sayers, C.M., and L.D. den Boer (2012) Characterizing production-induced anisotropy of fractured reservoirs having multiple fracture sets, *Geophys. Prosp.*, 60, 919–939.

Far, M.E., L. Thomsen, and C.M. Sayers (2012) Inversion for asymmetric fracture parameters using synthetic AVOA data, 82nd SEG Annual Meeting, Expanded Abstracts.

Sayers, CM, and L.D. den Boer (2011) Rock physics-based relations for density and S-velocity versus P-velocity in deepwater subsalt Gulf of Mexico shales, *The Leading Edge*, December 2011, 30 1376-1381.

Sayers, C.M. and L.D. den Boer (2011) Velocity-density relations for deepwater subsalt Gulf of Mexico shales, 81st SEG Annual Meeting, Expanded Abstracts.

Eftekharifar, M. and C.M. Sayers (2011) Seismic characterization of fractured reservoirs: A resolution matrix approach, 81st SEG Annual Meeting, Expanded Abstracts.

Eftekharifar, M. and C.M. Sayers (2011) Seismic characterization of fractured reservoirs: Inversion for fracture parameters illustrated using synthetic AVOA data, 81st SEG Annual Meeting, Expanded Abstracts.

L.D. den Boer, C.M. Sayers, S. Noeth, A. Hawthorn, P.J. Hooyman, and M.F. Smith (2011) Using Tomographic Seismic Velocities to Understand Subsalt Overpressure Drilling Risks in the Gulf of Mexico, OTC 21546, presented at the 2011 Offshore Technology Conference held in Houston, 2-5 May 2011.

Sayers, CM, and S. Noeth (2010) Sensitivity of velocities to overpressure within heterogeneous tight gas sand reservoirs, *The Leading Edge*, December 2010, 29, 1490-1493.

Sayers, C.M. and J. Le Calvez (2010) Characterization of microseismic data in gas shales using the radius of gyration tensor, 80th SEG Annual Meeting, Extended Abstracts.

Sayers, C.M. (2010) The effect of anisotropy on the Young's moduli and Poisson's ratios of shales, 80th SEG Annual Meeting, Extended Abstracts.

Sayers, C.M. (2010) Geophysics Under Stress: Geomechanical Applications of Seismic and Borehole Acoustic Waves: 2010 Distinguished Instructor Short Course, Society of Exploration Geophysicists, ISBN 1560802103

Sayers, C.M. (2009) The sensitivity of seismic waves to the normal and shear compliance of fractures, 79th SEG Annual Meeting, Extended Abstracts.

Sayers, C.M., Z. Nagy, J. Adachi, V. Singh, K. Tagbor, and P. Hooyman (2009) Determination of in-situ stress and rock strength using borehole acoustic data, 79th SEG Annual Meeting, Extended Abstracts.

C.M. Sayers, C.L. Russell, M. Pelorosso, J. Adachi, J.S. Pastor, V. Singh, K.M. Tagbor, and P.J. Hooyman (2009) Calibrating the mechanical properties and in-situ stresses using acoustic radial profiles, SPE 124161.

G. Han, K.S. Shepstone, I.S. Harmawan, U. Er, H. Jusoh, L.S. Lin, R. Koya, S. Carney, L.D. Barker, D. Pringle, N. Morita, E. Papamichos, P. Cerasi, C.M. Sayers, J.C. Heiland, M.S. Bruno and J. Diessl (2009) A Comprehensive Study of Sanding Rate from Gas Field: From Reservoir, Completion, Production, to Surface Facilities, SPE 123478.

Sayers, CM, Dahi Taleghani, A, and Adachi, J (2009) The effect of mineralization on the ratio of normal to tangential compliance of fractures, *Geophys. Prosp.*, 57, 439-446.

Zhang, Y, Sayers, CM, and Adachi, JI (2009) The use of effective medium theories for seismic wave propagation and fluid flow in fractured reservoirs under applied stress, *Geophys. J. Int.*, 177, 205 - 221.

Smith, TM, Sayers, CM, and Sondergeld, CH (2009) Rock properties in low-porosity/low-permeability sandstones, *The Leading Edge*, January 2009, 28, 48-594.

Sayers, CM (2008) The effect of low aspect ratio pores on the seismic anisotropy of shales, 78th SEG Annual Meeting, Extended Abstracts.

Sayers, CM, Adachi, J, and Dahi Taleghani, A (2008) The effect of near-wellbore yield on elastic wave velocities in sandstones, 78th SEG Annual Meeting, Extended Abstracts.

Zhang, Y, Sayers, CM, and Adachi, J (2008) The use of effective medium theories for seismic wave propagation and fluid flow in fractured reservoirs under applied stress, 78th SEG Annual Meeting, Extended Abstracts.

Sayers, CM (2008) The elastic properties of carbonates, *The Leading Edge*, August 2008, 1020-1024.

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Sayers, C.M., Kisra, S., Tagbor, K., Dahi Taleghani, A. and Adachi, J. (2007) Calibrating the mechanical properties and in-situ stresses using acoustic radial profiles, SPE 110089.

Sayers, CM (2007) Seismic characterization of reservoirs containing multiple fracture sets, 77th SEG Annual Meeting, Extended Abstracts.

Sayers, C.M. (2007) Effect of borehole stress concentration on elastic wave velocities in sandstones, *Int. J. Rock Mech.*, 44, 1045-1052.

Sayers, C.M. (2007) Asymmetry in the time-lapse seismic response to injection and depletion. *Geophysical Prospecting*, 55, 699-705.

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Sayers, CM, den Boer, LD, Nagy, ZR, and Hooyman, PJ (2006), Well-constrained seismic estimation of pore pressure with uncertainty, *The Leading Edge*, December 2006, 1524-1526.

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Conference and Exhibition in Mexico, 31 August-2 September, Cancun, Mexico.

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