

# Stephen E. Laubach

## Professional Summary

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## Professional Preparation

### Academic Background

Ph.D. Geology, University of Illinois-Urbana, 1986

M.S. Geology, University of Illinois-Urbana, 1983

B.S. Geology, Tufts University, 1978

### Professional Appointments

Senior Research Scientist, Bureau of Economic Geology, The University of Texas at Austin (June 1990-Present)

Developing and applying methods for fracture and stress characterization and interpretation. Understanding interactions of chemical and mechanical process in brittle rocks. Conducting field and laboratory studies of faults and fractures. Research on unconventional resources, tight gas and shale gas/oil, fractured carbonate rocks, and natural fracture/hydraulic fracture interaction.

Member, AAPG Executive Committee and AAPG Elected Editor (July 2010-July 2013).

Member, Graduate Studies Committees, Jackson School of Geosciences Department of Geological Sciences (2003-Present) and Energy and Earth Resources Graduate Program (2006-Present): Graduate research supervision and instruction.

Senior Technical Advisor, Bureau of Economic Geology (2006-2008)

Jackson Research Fellow (2003-2006); Jackson Research Excellence Fellow (2007-2009)

Supervisor, Bureau of Economic Geology Scanning Electron Microscope and Cathodoluminescence facility (1995-Present)

Founded Fracture Research and Application Consortium (1998) and Structural Diagenesis Initiative (2001)

Principal Investigator, numerous basic and energy-related research projects (1987-Present)

Member, AAPG Executive Committee, American Association of Petroleum Geologists (July 2010-July 2013)

Senior Technical Advisor, Bureau of Economic Geology (January 2006-December 2008)

Research Scientist, Bureau of Economic Geology, The University of Texas at Austin (March 1990-May 1996)

Developing and applying methods for fracture and stress characterization and interpretation. Laboratory studies of rock deformation. Laboratory analog studies of faulting. Tight gas

sandstone and coalbed methane research.

Served as Principal Investigator, Bureau of Economic Geology/Gas Research Institute Tight Gas Sands Program, 1990-1994, which was instrumental in developing and testing hydraulic fracturing technology.

Research Associate, Bureau of Economic Geology, The University of Texas at Austin (June 1986-February 1990)

Research on all aspects of tight gas, coalbed methane, and fractured shale geology. Research in support of hydraulic fracturing technology. Regional structural and stratigraphic studies of Gulf Coast, Rockies, Appalachians. Developing and applying methods for fracture and stress characterization and interpretation. Conducting borehole, field and laboratory studies of faults and fractures.

Visiting Lecturer, Lehigh University, Bethlehem, Pennsylvania (August 1985-June 1986)

Teaching structural geology and tectonics; Supervising graduate student research. Conducting research in structural geology of Appalachians.

Research Assistant, Teaching Assistant, University of Illinois - Urbana, Champaign Illinois (September 1980-July 1985)

Assisted in teaching: structural geology, petrology, mineralogy, crystal chemistry, field methods, introductory geology and research.

Instructor, Robertson Research, American Universities Field Course, Llandudno, North Wales, United Kingdom (May 1982-September 1983)

Teaching structural geology field techniques and helping organize and run field course.

Geologist, General Crude Oil Company, Houston, Texas (May-August 1977)

## Theses

Structural processes in the Conway Rhyolite Dome (North Wales): Magmatic implications: Urbana, Illinois, University of Illinois, M.S. thesis, 155 p., 1983

## Dissertations

Polyphase deformation, thrust-induced strain and metamorphism, and Mesozoic stratigraphy of the Granite Wash Mountains, west-central Arizona: Urbana, Illinois, University of Illinois, Ph.D. dissertation, 183 p., 1986

## Continuing Education Courses Taken

Techniques of Comprehensive Evaluation and Completion of Tight Gas Sand Reservoirs: Gas Research Institute Forum / Workshop in Association with The Society of Petroleum Engineers GasTechnology Symposium, June 1989

Principals of Rock Mechanics: Geological Society of America Short Course, November 1986

## Areas of Expertise

### Areas of Expertise

- A. Structural diagenesis; interaction of mechanical and chemical processes
- B. Structural petrology, petrographic fluid inclusion and cathodoluminescence studies
- C. Structural geology, fracture analysis, evolution of fault systems, physical modeling of faults
- D. Tectonics, structural evolution of North American Cordillera
- E. Application of borehole-imaging geophysical logs to stress and fracture evaluation
- F. Rock mechanics; geologic studies in support of hydraulic fracture technology

## Awards

## Awards and Honorary Societies

Fellow, Geological Society of America, 2016-Present

2016 Tinker Family BEG Publication Award In recognition of Exemplary Publication of Scientific or Economic Impact for the 2015 paper "Natural hydraulic fracturing of tight-gas sandstone reservoirs, Piceance Basin, Colorado" published in the Geological Society of America Bulletin, v. 127, no. 1-2, p. 61-75. (Andras Fall and co-authors Peter Eichhubl, Bob Bodnar, S. E. Laubach, and Steve Davis)

Distinguished Service Award, AAPG, 2016

Society of Petroleum Engineers, A Peer Apart, Distinguished Service in Technical Editing, 2015

Society of Petroleum Engineers, Award of Appreciation, Outstanding Technical Editor, 2015

AAPG Distinguished Lecturer, 2011-2012

Certificate of Recognition, excellence in technical presentation (co-author), SEPM, 2011

Co-author, Publication Award, Bureau of Economic Geology, 2011

President's Certificate for Excellence in Presentation (co-author), American Association of Petroleum Geologists Energy Minerals Division, Annual Meeting, 2011

BEG Centennial Distinguished Lecturer, 2009

Certificate of Appreciation, Geological Society of America (committee service), 2009

Society of Petroleum Engineers, Award of Appreciation, Outstanding Technical Editor, 2009

Jackson Research Excellence Fellow, 2007-2009

One of 10 Journal of Structural Geology Top Reviewers, 2008

Paper ("Practical Approaches to Identifying Sealed and Open Fractures," 2003) selected for reprint in Fractured Reservoirs, 2008

Paper ("Anisotropy and beyond: geological perspectives on geophysical prospecting for natural fractures," 2008) selected for reprint in AAPG Getting Started Series No. 13, Fractured Reservoirs, 2008

AAPG Award of Excellence "Top 10" Oral Presentations for "Structural Complexity in Structurally Simple Fractured Reservoir Analogs," which was presented at the AAPG Convention, Long Beach, 2007

Award of Appreciation, Outstanding Technical Editor, Society of Petroleum Engineers, SPE Reservoir Evaluation & Engineering, 2007

Certificate of Merit, American Association of Petroleum Geologists, 2007

Energy Minerals Division Best Poster Award, American Association of Petroleum Geologists (with Kira Diaz-Tushman and Randy Marrett), 2006

Paper ("Practical Approaches to Identifying Sealed and Open Fractures," 2003) selected for inclusion in Understanding Diagenetic Controls on Sandstone Reservoir Quality: A Compendium of Influential Papers, 2006

Jackson Research Fellow, 2003-2006

Best University Research Presentation at the U.S. Department of Energy Symposium Flow and Transport: from Pore to Reservoir Scales (co-author), 2004

Distinguished Lecturer, Society of Petroleum Engineers, 2004

Best Luncheon Paper-Third Place, Rocky Mountain Association of Geologists, 2001

Honorable Mention, Oral Presentation (Co-Author), SEPM (Society for Sedimentary Geologists),

2001

Honorable Mention, Poster Presentation, SEPM (Society for Sedimentary Geologists), 2001

Citation of Excellence of Review, AAPG Bulletin, 1999

Jules Braunstein Memorial Award, American Association of Petroleum Geologists, 1999

Outstanding Technical Editor, Society of Petroleum Engineers, 1999

Best Presentation Award, Clastic Diagenesis Research Group SEPM, 1997

Energy Minerals Division Best Paper Award, American Association of Petroleum Geologists, 1992

Energy Minerals Division Best Paper Award, American Association of Petroleum Geologists, 1991

President's Certificate for Excellence in Presentation, American Association of Petroleum Geologists Energy Minerals Division, annual meeting, 1991

Honorable mention, Geological Society of America Coal Division, for paper presented at annual meeting, 1990

Best of SPE, paper presented at American Association of Petroleum Geologists, annual meeting, 1988

## Publications

### Peer Reviewed Journal Articles

Elliott, S. J., Forstner, S. R., Wang, Q., Corrêa, R., Shakiba, M., Fulcher, S. A., Hebel, N. J., Lee, B. T., Tirmizi, S. T., Hooker, J. N., Fall, A., Olson, J. E., and Laubach, S. E., 2025, Diagenesis is key to unlocking outcrop fracture data suitable for quantitative extrapolation to geothermal targets: *Frontiers in Earth Science*, v. 13, no. 1545052, 38 p., <http://doi.org/10.3389/feart.2025.1545052>.

Eppes, M. C., Rinehart, A., Aldred, J., Berberich, S., Dahlquist, M. P., Evans, S. G., Keanini, R., Laubach, S. E., Moser, F., Morovati, M., Porson, S., Rasmussen, M., and Shaanan, U., 2024, Introducing standardized field methods for fracture-focused surface process research: *Earth Surface Dynamics*, v. 12, no. 1, p. 35-66, <http://doi.org/10.5194/esurf-12-35-2024>.

Shakiba, M., Lake, L. W., Gale, J. F. W., Laubach, S. E., and Pyrcz, M. J., 2024, Stochastic reconstruction of fracture network pattern using spatial point processes: *Geoenergy Science and Engineering*, v. 236, no. 212741, 19 p., <http://doi.org/10.1016/j.geoen.2024.212741>.

Hooker, J. N., Katz, R. F., Laubach, S. E., Cartwright, J., Eichhubl, P., Ukar, E., Bloomfield, D., and Engelder, T., 2023, Fracture-pattern growth in the deep, chemically reactive subsurface: *Journal of Structural Geology*, v. 173, no. 104915, 21 p., <http://doi.org/10.1016/j.jsg.2023.104915>.

Laubach, S. E., Zeng, L., Hooker, J. N., Wang, Q., Zhang, R., Wang, J., and Ren, B., 2023, Deep and ultra-deep basin brittle deformation with focus on China: *Journal of Structural Geology*, v. 175, no. 104938, 13 p., <http://doi.org/10.1016/j.jsg.2023.104938>.

Shakiba, M., Lake, L. W., Gale, J. F. W., Laubach, S. E., and Pyrcz, M. J., 2023, Multiscale spatial analysis of fracture nodes in two dimensions: *Marine and Petroleum Geology*, v. 149, no. 106093, 19 p., <http://doi.org/10.1016/j.marpetgeo.2022.106093>.

Wang, Q., Narr, W., and Laubach, S. E., 2023, Quantitative characterization of fracture spatial arrangement and intensity in a reservoir anticline using horizontal wellbore image logs and an outcrop analog: *Marine and Petroleum Geology*, v. 152, no. 106238, 24 p., <http://doi.org/https://doi.org/10.1016/j.marpetgeo.2023.106238>.

Corrêa, R. S. M., Marrett, R., and Laubach, S. E., 2022, Analysis of spatial arrangement of

fractures in two dimensions using point process statistics: *Journal of Structural Geology*, v. 163, no. 104726, 13 p., <http://doi.org/10.1016/j.jsg.2022.104726>.

Corrêa, R. S. M., Ukar, E., Laubach, S. E., Aubert, I., Lamarche, J., Wang, Q., Stockli, D. F., Stockli, L. D., and Larson, T. E., 2022, Episodic reactivation of carbonate fault zones with implications for permeability--an example from Provence, Southeast France: *Marine and Petroleum Geology*, v. 145, no. 105905, 21 p., <http://doi.org/10.1016/j.marpetgeo.2022.105905>.

Forstner, S. R., and Laubach, S. E., 2022, Scale-dependent fracture networks: *Journal of Structural Geology*, v. 165, no. 104748, 21 p., <http://doi.org/10.1016/j.jsg.2022.104748>.

Gale, J. F. W., Fall, A., Yurchenko, I. A., Ali, W. A., Laubach, S. E., Eichhubl, P., and Bodnar, R. J., 2022, Opening-mode fracturing and cementation during hydrocarbon generation in shale: an example from the Barnett Shale, Delaware Basin, West Texas: *AAPG Bulletin*, v. 106, no. 10, p. 2103-2141, <http://doi.org/10.1306/01062219274>.

Rysak, B., Gale, J. F. W., Laubach, S. E., Ferrill, D. A., and Olson, J. E., 2022, Mechanisms for the generation of complex fracture networks: observations from slant core, analog models, and outcrop: *Frontiers in Earth Science*, v. 10, no. 848012, 18 p., <http://doi.org/10.3389/feart.2022.848012>.

Wang, J., Zeng, L., Yang, X., Liu, C., Wang, K., Zhang, R., Chen, X., Qu, Y., Laubach, S. E., and Wang, Q., 2021, Fold-related fracture distribution in Neogene, Triassic, and Jurassic sandstone outcrops, northern margin of the Tarim Basin, China: guides to deformation in ultradeep tight sandstone reservoirs: *Lithosphere*, v. 2021, special 1, no. 8330561, 17 p., <http://doi.org/10.2113/2021/8330561>.

Almansour, A., Laubach, S. E., Bickel, J. E., and Schultz, R. A., 2020, Value-of-information analysis of a fracture prediction method: *SPE Reservoir Evaluation & Engineering*, v. 23, no. 3, p. 811-823, <http://doi.org/10.2118/198906-PA>.

Baqués, V., Ukar, E., Laubach, S. E., Forstner, S. R., and Fall, A., 2020, Fracture, dissolution, and cementation events in Ordovician carbonate reservoirs, Tarim Basin, NW China: *Geofluids*, v. 2020, no. 9037429, 28 p., <http://doi.org/10.1155/2020/9037429>.

Denny, A. C., Fall, A., Orland, I. J., Valley, J. W., Eichhubl, P., and Laubach, S. E., 2020, A history of pore water oxygen isotope evolution in the Cretaceous Travis Peak Formation in East Texas: *Geological Society of America Bulletin*, v. 132, no. 7/8, p. 1626-1638, <http://doi.org/10.1130/B35291.1>.

Ukar, E., Baqués, V., Laubach, S. E., and Marrett, R., 2020, The nature and origins of decametre-scale porosity in Ordovician carbonate rocks, Halahatang oilfield, Tarim Basin, China: *Journal of the Geological Society*, v. 177, no. 5, p. 1074-1091, <http://doi.org/10.1144/jgs2019-156>.

Laubach, S. E., Lander, R. H., Criscenti, L. J., Anovitz, L. M., Urai, J. L., Pollyea, R. M., Hooker, J. N., Narr, W., Evans, M. A., Kerisit, S. N., Olson, J. E., Dewers, T., Fisher, D., Bodnar, R., Evans, B., Dove, P., Bonnell, L. M., Marder, M. P., and Pyrak-Nolte, L., 2019, The role of chemistry in fracture pattern development and opportunities to advance interpretations of geological materials: *Reviews of Geophysics*, v. 57, no. 3, p. 1065-1111, <http://doi.org/10.1029/2019RG000671>.

Ramos, M. J., Espinoza, D. N., Goldfarb, E. J., Tisato, N., Laubach, S. E., and Torres-Verdin, C., 2019, Microstructural controls on elastic anisotropy of finely laminated Mancos Shale: *Geophysical Journal International*, v. 216, no. 2, p. 991-1004, <http://doi.org/10.1093/gji/ggy474>.

Ramos, M. J., Espinoza, D. N., Laubach, S. E., and Torres-Verdin, C., 2019, Quantifying static and dynamic stiffness anisotropy and nonlinearity in finely laminated shales: experimental measurement and modeling: *Geophysics*, v. 84, no. 1, p. MR25-MR36, <http://doi.org/10.1190/geo2018-0032.1>.

Ukar, E., Laubach, S. E., and Hooker, J. N., 2019, Outcrops as guides to subsurface natural fractures: example from the Nikanassin Formation tight-gas sandstone, Grande Cache, Alberta foothills, Canada: *Marine and Petroleum Geology*, v. 103, p. 255-275, <http://doi.org/10.1016/j.marpetgeo.2019.01.039>.

Wang, Q., Laubach, S. E., Gale, J. F. W., and Ramos, M. J., 2019, Quantified fracture (joint) clustering in Archean basement, Wyoming: application of normalized correlation count method: *Petroleum Geoscience*, v. 25, no. 4, p. 415-428, <http://doi.org/10.1144/petgeo2018-146>, [Supervised graduate student paper].

Wang, Q., Laubach, S. E., Gale, J. F. W., and Ramos, M. J., 2019, Quantified fracture (joint) clustering in Archean basement, Wyoming: application of the normalized correlation count method: *Petroleum Geoscience*, v. 25, no. 4, p. 415-428, <http://doi.org/10.1144/petgeo2018-146>.

Weisenberger, T. B., Eichhubl, P., Laubach, S. E., and Fall, A., 2019, Degradation of fracture porosity in sandstone by carbonate cement, Piceance Basin, Colorado, USA: *Petroleum Geoscience*, v. 25, no. 4, p. 354-370, <http://doi.org/10.1144/petgeo2018-162>.

Hooker, J. N., Laubach, S. E., and Marrett, R. A., 2018, Microfracture spacing distributions and the evolution of fracture patterns in sandstones: *Journal of Structural Geology*, v. 108, p. 66-79, <http://doi.org/10.1016/j.jsg.2017.04.001>.

Laubach, S. E., Hundley, T. H., Hooker, J. N., and Marrett, R. A., 2018, Spatial arrangement and size distribution of normal faults, Buckskin detachment upper plate, Western Arizona: *Journal of Structural Geology*, v. 108, p. 230-242, <http://doi.org/10.1016/j.jsg.2017.10.001>.

Laubach, S. E., Lamarche, J., Gauthier, B. D. M., Dunne, W. M., and Sanderson, D. J., 2018, Spatial arrangement of faults and opening-mode fractures: *Journal of Structural Geology*, v. 108, p. 2-15, <http://doi.org/10.1016/j.jsg.2017.08.008>.

Li, J. Z., Laubach, S. E., Gale, J. F. W., and Marrett, R. A., 2018, Quantifying opening-mode fracture spatial organization in horizontal wellbore image logs, core and outcrop: application to Upper Cretaceous Frontier Formation tight gas sandstones, USA: *Journal of Structural Geology*, v. 108, p. 137-156, <http://doi.org/10.1016/j.jsg.2017.07.005>.

Marrett, R. A., Gale, J. F. W., Gomez, L., and Laubach, S. E., 2018, Correlation analysis of fracture arrangement in space: *Journal of Structural Geology*, v. 108, p. 16-33, <http://doi.org/10.1016/j.jsg.2017.06.012>.

Ukar, E., Lopez, R. G., Gale, J. F. W., Laubach, S. E., and Mancada, R., 2017, New type of kinematic indicator in bed-parallel veins, Late Jurassic-Early Cretaceous Vaca Muerta Formation, Argentina: E-W shortening during Late Cretaceous vein opening: *Journal of Structural Geology*, v. 104, p. 31-47, <http://doi.org/10.1016/j.jsg.2017.09.014>.

Ukar, E., Lopez, R. G., Laubach, S. E., Gale, J. F. W., Mancada, R., and Marrett, R., 2017, Microfractures in bed-parallel veins (beef) as predictors of vertical macrofractures in shale: Vaca Muerta Formation, Agrio Fold-and-Thrust Belt, Argentina: *Journal of South American Earth Sciences*, v. 79, p. 152-169, <http://doi.org/10.1016/j.jsames.2017.07.015>.

Fall, A., Ukar, E., and Laubach, S. E., 2016, Origin and timing of Dauphiné twins in quartz cement in fractured sandstones from diagenetic environments: Insight from fluid inclusions: *Tectonophysics*, v. 687, p. 195-209, <http://doi.org/10.1016/j.tecto.2016.08.014>.

Laubach, S. E., Fall, A., Copley, L. K., Marrett, R., and Wilkins, S. J., 2016, Fracture porosity creation and persistence in a basement-involved Laramide fold, Upper Cretaceous Frontier Formation, Green River Basin, U.S.A.: *Geological Magazine*, v. 153, no. 5/6, p. 887-910, <http://doi.org/10.1017/S0016756816000157>.

Ukar, E., and Laubach, S. E., 2016, Syn- and postkinematic cement textures in fractured carbonate rocks: Insights from advanced cathodoluminescence imaging: *Tectonophysics*, v.

690, no. A, p. 190-205, <http://doi.org/10.1016/j.tecto.2016.05.001>.

Ukar, E., Laubach, S. E., and Marrett, R., 2016, Quartz c-axis orientation patterns in fracture cement as a measure of fracture opening rate and a validation tool for fracture pattern models: *Geosphere*, v. 12, no. 2, p. 400-438, <http://doi.org/10.1130/GES01213.1>.

Alzayer, Y., Eichhubl, P., and Laubach, S. E., 2015, Non-linear growth kinematics of opening-mode fractures: *Journal of Structural Geology*, v. 74, p. 31-44, <http://doi.org/10.1016/j.jsg.2015.02.003>.

Fall, A., Eichhubl, P., Bodnar, R. J., Laubach, S. E., and Davis, J. S., 2015, Natural hydraulic fracturing of tight-gas sandstone reservoirs, Piceance Basin, Colorado: *Geological Society of America Bulletin*, v. 127, no. 1-2, p. 61-75, <http://doi.org/10.1130/B31021.1>.

Hooker, J.N., Larson, T., Eakin, A., Laubach, S. E., Eichhubl, P., Fall, A., and Marrett, R., 2015, Fracturing and fluid flow in a sub-décollement sandstone; or, a leak in the basement: *Journal of the Geological Society*, v. 172, p. 428-442, <http://doi.org/10.1144/jgs2014-128>, <http://jgs.lyellcollection.org/content/172/4/428.full.pdf+html>.

Lander, R. H., and Laubach, S. E., 2015, Insights into rates of fracture growth and sealing from a model for quartz cementation in fractured sandstones: *Geological Society of America Bulletin*, v. 127, no. 3/4, p. 516-538, <http://doi.org/10.1130/B31092.1>.

Anders, M. H., Laubach, S. E., and Scholz, C. H., 2014, Microfractures: a review: *Journal of Structural Geology*, v. 69, p. 377-394, <http://doi.org/10.1016/j.jsg.2014.05.011>.

Gale, J. F. W., Laubach, S. E., Olson, J. E., Eichhubl, P., and Fall, A., 2014, Natural fractures in shale: a review and new observations: *AAPG Bulletin*, v. 98, no. 11, p. 2165-2216, <http://doi.org/10.1306/08121413151>.

Hooker, J. N., Laubach, S. E., and Marrett, R., 2014, A universal power-law scaling exponent for fracture apertures in sandstone: *Geological Society of America Bulletin*, v. 126, no. 9-10, p. 1340-1362, <http://doi.org/10.1130/B30945.1>.

Laubach, S. E., Eichhubl, P., Hargrove, P., Ellis, M. A., and Hooker, J. N., 2014, Fault core and damage zone fracture attributes vary along strike owing to interaction of fracture growth, quartz accumulation, and differing sandstone composition: *Journal of Structural Geology*, v. 68, Part A, p. 207-226, <http://doi.org/10.1016/j.jsg.2014.08.007>.

Hooker, J. N., Laubach, S. E., and Marrett, R. A., 2013, Fracture-aperture size--frequency, spatial distribution, and growth processes in strata-bounded and non-strata-bounded fractures, Cambrian Mesón Group, NW Argentina: *Journal of Structural Geology*, v. 54, p. 54-71.

Ellis, Magdalena, Laubach, S. E., Eichhubl, P., Olson, J., and Hargrove, Peter, 2012, Fracture development and diagenesis of Torridon Group Applecross Formation, near An Teallach, NW Scotland: millennia of brittle deformation resilience: *Journal of the Geological Society, London*, v. 169, p. 297-310, <http://doi.org/10.1144/0016-76492011-086>, 2012 Top 10 'Most Read' (downloads) for journal, according to publisher.

Fall, A., Eichhubl, P., Cumella, S. P., Bodnar, R. J., Laubach, S. E., and Becker, S. P., 2012, Testing the basin-centered gas accumulation model using fluid inclusion observations: *Southern Piceance Basin, Colorado: AAPG Bulletin*, v. 96, no. 12, p. 2297-2318.

Garland, J., Neilson, J. E., Laubach, S. E., and Whidden, K. J., 2012, Advances in carbonate exploration and reservoir analysis, in Garland, J., Neilson, J. E., Laubach, S. E., and Whidden, K. J., eds., *Advances in carbonate exploration and reservoir analysis: Geological Society, London, Special Publication 370*, p. 1-15.

Hooker, J. N., Gomez, L. A., Laubach, S. E., Gale, J. F. W., and Marrett, R. A., 2012, Effects of diagenesis (cement precipitation) during fracture opening on fracture aperture-size scaling in carbonate rocks, in Garland, J., Neilson, J. E., Laubach, S. E., and Whidden, K. J., eds., *Advances in carbonate exploration and reservoir analysis: Geological Society, London, Special*

Publication 370, p. 187-206.

Iñigo, J. F., Laubach, S. E., and Hooker, J. N., 2012, Fracture abundance and patterns in the Subandean fold and thrust belt, Devonian Huamampampa Formation petroleum reservoirs and outcrops, Argentina and Bolivia: *Marine and Petroleum Geology*, v. 35, p. 201-218.

Hooker, J. N., Laubach, S. E., Gomez, L. A., Marrett, R. A., Eichhubl, P., Diaz Tushman, K., and Pinzon, E. A., 2011, Fracture size, frequency, and strain in the Cambrian Eriboll Formation sandstones, NW Scotland: *Scottish Journal of Geology*, v. 47, p. 45-56.

Ozkan, A., Cumella, S. P., Milliken, K. L., and Laubach, S. E., 2011, Prediction of lithofacies and reservoir quality using well logs, Late Cretaceous Williams Fork Formation, Mamm Creek field, Piceance Basin, Colorado: *AAPG Bulletin*, v. 95, no. 10, p. 1699-1725.

Becker, S. P., Eichhubl, P., Laubach, S. E., Reed, R. M., Lander, R. H., and Bodnar, R. J., 2010, A 48 m.y. history of fracture opening, temperature, and fluid pressure: Cretaceous Travis Peak Formation, East Texas Basin: *Geological Society of America Bulletin*, v. 122, no. 7/8, p. 1081-1093.

Eichhubl, P., Hooker, J. N., and Laubach, S. E., 2010, Pure and shear-enhanced compaction bands in Aztec Sandstone: *Journal of Structural Geology*, v. 32, p. 1873-1886.

Gale, Julia F. W., Lander, R., Reed, R. M., and Laubach, S. E., 2010, Modeling fracture porosity evolution in dolostone: *Journal of Structural Geology*, v. 32, p. 1201-1211. doi:10.1016/j.jsg.2009.04.018.

Laubach, S. E., Eichhubl, P., Hilgers, C., and Lander, R. H., 2010, Structural diagenesis: *Journal of Structural Geology*, v. 32, no. 4, p. 1866-1872.

Hooker, J. N., Gale, J. F. W., Gomez, L. A., Laubach, S. E., Marrett, R. A., and Reed, R. M., 2009, Aperture-size scaling variations in a low-strain opening-mode fracture set, Cozzette Sandstone, Colorado: *Journal of Structural Geology*, v. 31, p. 707-718.

Laubach, S. E., and Tushman, K. D., 2009, Laurentian palaeostress trajectories and ephemeral fracture permeability, Cambrian Eriboll Group sandstones west of the Moine Thrust Zone, northwest Scotland: *Journal of the Geological Society, London*, v. 166, part 2, p. 345-360.

Laubach, S. E., Olson, J. E., and Gross, M. E., 2009, Mechanical and fracture stratigraphy: *AAPG Bulletin*, v. 93, no. 11, p. 1413-1426.

Olson, J. E., Laubach, S. E., and Lander, R. H., 2009, Natural fracture characterization in tight gas sandstones: integrating mechanics and diagenesis: *AAPG Bulletin*, v. 93, no. 11, p. 1535-1549.

Olson, J., Laubach, S. E., and Lander, R., 2007, Combining diagenesis and mechanics to quantify fracture aperture distributions and fracture pattern permeability, in Lonergan, L., Rawnsley, K., and Sanderson, D., eds., *Fractured reservoirs: Geological Society of London Special Publication*, v. 270, p. 97-112.

Gomez, L. A., and Laubach, S. E., 2006, Rapid digital quantification of microfracture populations: *Journal of Structural Geology*, v. 28, p. 408-420.

Laubach, S. E., and Gale, J. F. W., 2006, Obtaining fracture information for low-permeability (tight) gas sandstones from sidewall cores: *Journal of Petroleum Geology*, v. 29, no. 2, p. 147-158.

Laubach, S. E., and Ward, M. E., 2006, Diagenesis in porosity evolution of opening-mode fractures, Middle Triassic to Lower Jurassic La Boca Formation, NE Mexico: *Tectonophysics*, v. 419, nos. 1-4, p. 75-97.

Ortega, O. J., Marrett, R. A., and Laubach, S. E., 2006, A scale-independent approach to fracture intensity and average spacing measurement: *AAPG Bulletin*, v. 90, no. 2, p. 193-208.



Gale, J. F. W., Laubach, S. E., Olson, Jon, and Marrett, Randall, 2005, Using the link between diagenesis and fracturing to accurately predict, characterize, and model fluid-flow in fractured carbonate rocks: Society of Petroleum Engineers, Paper No. 97382, 7 p.

Philip, Z. G., Jennings, J. W., Jr., Olson, J., Laubach, S. E., and Holder, Jon, 2005, Modeling coupled fracture-matrix fluid flow in geomechanically simulated fracture networks: Society of Petroleum Engineers, SPE Reservoir Evaluation & Engineering, v. 8, no. 4, p. 300-309.

Gale, J. F. W., Laubach, S. E., Marrett, R. A., Olson, J. E., Holder, Jon, and Reed, R. M., 2004, Predicting and characterizing fractures in dolostone reservoirs: using the link between diagenesis and fracturing, in Braithwaite, C. J. R., Rizzi, G., and Darke, G., eds., The geometry and petrogenesis of dolomite hydrocarbon reservoirs: London, Geological Society, Special Publications, 235, p. 177-192.

Laubach, S. E., Lander, R. H., Bonnell, L. M., Olson, J. E., and Reed, R. M., 2004, Opening histories of fractures in sandstones, in Cosgrove, J. W., and Engelder, T., eds., The initiation, propagation, and arrest of joints and other fractures: Geological Society, London, Special Publications, 231, p. 1-9.

Laubach, S. E., Olson, J. E., and Gale, J. F. W., 2004, Are open fractures necessarily aligned with maximum horizontal stress?: Earth and Planetary Science Letters, v. 222, no. 1, p. 191-195.

Laubach, S. E., Reed, R. M., Olson, J. E., Lander, R. H., and Bonnell, L. M., 2004, Coevolution of crack-seal texture and fracture porosity in sedimentary rocks: cathodoluminescence observations of regional fractures: Journal of Structural Geology, v. 26, no. 5, p. 967-982.

Laubach, S. E., 2003, Practical approaches to identifying sealed and open fractures: AAPG Bulletin, v. 87, no. 4, p. 561-579. Reprinted in Understanding Diagenetic Controls on SS Reservoir Quality: a Compendium of Influential Papers: American Association of Petroleum Geologists, Getting Started, No. 4, CD ROM, 2006, and reprinted in: AAPG Getting Started, No. 13, Fractured Reservoirs, 2008.

Philip, Z. G., Jennings, J. W., Jr., Olson, J., Laubach, S. E., and Holder, Jon, 2002, Modeling coupled fracture-matrix fluid flow in geomechanically simulated fracture networks: Society of Petroleum Engineers, SPE Paper No. 77340, 13 p.

Laubach, S. E., Schultz-Ela, D., and Tyler, Roger, 2000, Differential compaction of interbedded sandstone and coal, in Cosgrove, J. W., and Ameen, M. S., eds., Forced folds and fractures: Geological Society, London, Special Publications, 169, p. 51-60.

Laubach, S. E., and Doherty, Eloise, 1999, Oriented drilled sidewall cores for natural fracture evaluation: Society of Petroleum Engineers, Paper SPE 56801, p. 793-800.

Laubach, S. E., Marrett, Randall, Olson, J., and Scott, A. R., 1998, Characteristics and origins of coal cleat: a review: International Journal of Coal Geology, v. 35, p. 175-207.

Laubach, S. E., 1997, A method to detect natural fracture strike in sandstones: AAPG Bulletin, v. 81, no. 4, p. 604-623.

Marrett, Randall, and Laubach, S. E., 1997, Diagenetic controls on fracture permeability and sealing: International Journal of Rock Mechanics and Mining Science, v. 34, no. 3-4, p. 204.e1-204.e11.

Laubach, S. E., Mace, R. E., and Nance, H. S., 1995, Fault and joint swarms in a normal fault zone, in Rossmanith, H.-P., ed., Mechanics of jointed and faulted rock: Rotterdam, Balkema, p. 305-309.

Laubach, S. E., Tyler, Roger, and Ambrose, W. A., 1995, Preliminary map of fracture patterns in coal in the western United States, in Myer, L. R., Cook, N. G. W., Goodman, R. E., and Tsang, C.-F., eds., Fractured and jointed rock masses: Rotterdam, Balkema, p. 177-184.

Laubach, S. E., and Tremain, C. M., 1994, Tectonic setting of the San Juan Basin, in Ayers, W. B., Jr., and Kaiser, W. R., eds., Coalbed methane in the Upper Cretaceous Fruitland Formation, San Juan Basin, New Mexico and Colorado: New Mexico Bureau of Mines and Mineral Resources Bulletin 146, published in cooperation with The University of Texas at Austin, Bureau of Economic Geology, Report of Investigations No. 218, and Colorado Geological Survey, Division of Minerals and Geology, Department of Natural Resources, Series 31, p. 9-11.

Tremain, C. M., Laubach, S. E., and Whitehead, N. H., III, 1994, Fracture (cleat) patterns in Upper Cretaceous Fruitland Formation coal seams, San Juan Basin, in Ayers, W. B., Jr., and Kaiser, W. R., eds., Coalbed methane in the Upper Cretaceous Fruitland Formation, San Juan Basin, New Mexico and Colorado: The University of Texas at Austin, Bureau of Economic Geology, and Colorado Geological Survey, Division of Minerals and Geology, Department of Natural Resources, Report of Investigations No. 218 and Resource Series 31, p. 87-102.

Laubach, S. E., Schultz-Ela, D., and Tyler, Roger, 1993, Analysis of compaction effects on coal fracture patterns, Upper Cretaceous Rock Springs Formation, southwestern Wyoming: *The Mountain Geologist*, v. 30, no. 3, p. 95-110.

Marin, B. A., Clift, S. J., Hamlin, H. S., and Laubach, S. E., 1993, Natural fractures in Sonora Canyon sandstones, Sonora and Sawyer fields, Sutton County, Texas: Society of Petroleum Engineers, Paper No. SPE 25895, p. 523-531.

Collins, E. W., Hovorka, S. D., and Laubach, S. E., 1992, Fracture systems of the Austin Chalk, North-Central Texas, in Schmoker, J. W., Coalson, E. B., and Brown, C. A., eds., Geological studies relevant to horizontal drilling in western North America: Rocky Mountain Association of Geologists, p. 75-88.

Laubach, S. E., 1992, Fracture networks in selected Cretaceous sandstones of the Green River and San Juan Basins, Wyoming, New Mexico, and Colorado, in Schmoker, J. W., Coalson, E. B., and Brown, C. A., eds., Geological studies relevant to horizontal drilling in western North America: Rocky Mountain Association of Geologists, p. 61-74.

Laubach, S. E., Tyler, Roger, Ambrose, W. A., Tremain, C. M., and Grout, M. A., 1992, Preliminary map of fracture patterns in coal in the western United States, in Mullen, C. E., ed., Rediscover the Rockies: Wyoming Geological Association, 43rd Field Conference Guidebook, p. 253-267.

Laubach, S. E., Vendeville, B. C., and Reynolds, S. J., 1992, Patterns in the development of extensional fault-block shape from comparison of outcrop-scale faults and experimental physical models, in Larsen, R. M., ed., Structural and tectonic modeling and its application to petroleum geology: Norwegian Petroleum Society Special Publication, p. 95-102.

Laubach, S. E., 1991, Fracture patterns in low-permeability-sandstone gas reservoir rocks in the Rocky Mountain region: Society of Petroleum Engineers, SPE Paper No. 21853, p. 501-510.

Tremain, C. M., Laubach, S. E., and Whitehead, N. H., III, 1991, Coal fracture studies: guides for coalbed methane exploration and development: *Journal of Coal Quality*, v. 10, no. 3, p. 81-88.

Henry, C. D., Price, J. G., Rubin, J. N., and Laubach, S. E., 1990, Case study of an extensive silicic lava: the Bracks Rhyolite, Trans-Pecos Texas: *Journal of Volcanology and Geothermal Research*, v. 43, p. 113-132.

Laubach, S. E., and Jackson, M. L. W., 1990, Origin of arches in the northwestern Gulf of Mexico basin: *Geology*, v. 18, no. 7, p. 595-598.

Laubach, S. E., 1989, Paleostress directions from the preferred orientation of closed microfractures (fluid-inclusion planes) in sandstone, East Texas basin, U.S.A.: *Journal of Structural Geology*, v. 11, no. 5, p. 603-611.

Laubach, S. E., Reynolds, S. J., Spencer, L., and Marshak, S., 1989, Progressive deformation

and superposed fabrics related to Cretaceous crustal underthrusting in western Arizona, U.S.A.: *Journal of Structural Geology*, v. 11, no. 6, p. 735-749.

Reynolds, S. J., Spencer, L., Asmerom, Y., DeWitt, E., and Laubach, S. E., 1989, Early Mesozoic uplift in west-central Arizona and southeastern California: *Geology*, v. 17, no. 3, p. 207-212.

Laubach, S. E., 1988, Fractures generated during folding of the Palmerton Sandstone, eastern Pennsylvania: *The Journal of Geology*, v. 96, no. 4, p. 495-503.

Laubach, S. E., 1988, Subsurface fractures and their relationship to stress history in East Texas Basin sandstone: *Tectonophysics*, v. 156, p. 37-49.

Laubach, S. E., and Marshak, S., 1987, Fault patterns generated during extensional deformation of crystalline basement, NW Scotland, in Coward, M. P., and others, eds., *Continental extensional tectonics: Geological Society Special Publication No. 28*, p. 495-499.

Laubach, S. E., Reynolds, S. J., and Spencer, J. E., 1987, Mesozoic stratigraphy of the Granite Wash Mountains, west-central Arizona: *Arizona Geological Society Digest*, v. 18, p. 91-100.

Reynolds, S. J., Spencer, J. E., Richard, S. M., and Laubach, S. E., 1986, Mesozoic structures in west-central Arizona: *Arizona Geological Society Digest*, v. 16, p. 35-51.

### Peer Reviewed Book Chapters

Gale, J. F. W., Elliott, S. J., Rysak, B. G., and Laubach, S. E., 2023, The critical role of core in understanding hydraulic fracturing, in Neal, A., Ashton, M., Williams, L. S., Dee, S. J., Dodd, T. J. H. and Marshall, J. D., eds., *Core values: the role of core in twenty-first century reservoir characterization: Geological Society of London, Special Publication*, v. 527, no. 1, 16 p., <http://doi.org/10.1144/SP527-2021-198>.

English, J. M., and Laubach, S. E., 2017, Opening-mode fracture systems: insights from recent fluid inclusion microthermometry studies of crack-seal fracture cements, in Turner, J. P., Healy, D., Hillis, R. R., and Welch, M. J., eds., *Geomechanics and Geology: London, Geological Society, Special Publications*, v. 458, p. 257-272, <http://doi.org/10.1144/SP458.1>.

Milliken, K., Reed, R. M., and Laubach, S. E., 2005, Chapter 14. Quantifying compaction and cementation in deformation bands in porous sandstones, in Sorkhabi, R., and Tsuji, Y., eds., *Faults, fluid flow, and petroleum traps: AAPG Memoir 85*, p. 237-249.

Gomez, L. A., Gale, J. F. W., Laubach, S. E., and Cumella, S. P., 2003, Chapter 6, Quantifying fracture intensity: an example from the Piceance Basin, in Peterson, K. M., Olson, T. M., and Anderson, D. S., eds., *Piceance Basin 2003 guidebook: Rocky Mountain Association of Geologists*, p. 96-113.

Milliken, K., and Laubach, S. E., 2000, Chapter 9. Brittle deformation in sandstone diagenesis as revealed by scanned cathodoluminescence imaging with application to characterization of fractured reservoirs, in Pagel, M., ed., *Cathodoluminescence and related techniques in geosciences and materials: New York, Springer-Verlag*, p. 225-243.

Laubach, S. E., 1996, (with others from the Committee on Fracture Characterization and Fluid Flow) Appendix 2.B. Fracture patterns in Frontier Formation sandstones, southwestern Wyoming, in ed., *Rock fractures and fluid flow: contemporary understanding and applications: Washington, D.C., National Academy Press*, p. 88-91.

Richard, S. M., Laubach, S. E., Reynolds, S. J., and Spencer, J. E., 1990, Mesozoic thrusting, synplutonic deformation, and Miocene overprinting, Harcuvar complex: a section through the pre-Tertiary crust of west-central Arizona, in Gehrels, G. E., and Spencer, J. E., eds., *Geologic excursions through the Sonoran Desert region, Arizona and Sonora: Arizona Geological Survey, Special Paper 7*, p. 66-75.

Reynolds, S. J., Richard, S. M., Haxel, G. B., Tosdal, R. M., and Laubach, S. E., 1988, *Geologic*

setting of Mesozoic and Cenozoic metamorphism in Arizona, in Ernst, W. G., ed., *Metamorphism and crustal evolution of the western United States*: Englewood Cliffs, N.J., Prentice Hall, p. 467-501.

## Patents

Laubach, S. E., Method for determining optimum horizontal drilling direction and drilling horizon: 95-120/0708, 12 p., Patent Number 5741967, received April 21, 1998.

## Non Peer Reviewed Authored Books

Garland, J., Neilson, J. E., Laubach, S. E., and Whidden, K. J., 2012, *Advances in carbonate exploration and reservoir analysis*: Geological Society of London, Special Publication 370, 311 p.

Lankford, A. J., Alhassid, Y., Coccia, E., Fairhurst, C., Fillipone, B. W., Fisher, P., Kajita, T., Laubach, S. E., Nelson, A., Ong, R. A., Sciulli, F. J., Shapiro, E. O., and Tiedje, J. M., 2011, *An assessment of the Deep Underground Science and Engineering Laboratory*: Washington, D.C., National Academy Press, 94 p.

Laubach, S. E., and Tinker, S. W., 2009, *Earth's art: celebrating the Centennial of the Bureau of Economic Geology, 1909-2009*: The University of Texas at Austin, Bureau of Economic Geology, 142 p.

Dutton, S. P., Hamlin, H. S., and Laubach, S. E., 1995, *Geologic controls on reservoir properties of low-permeability sandstone, Frontier Formation, Moxa Arch, southwestern Wyoming*: The University of Texas at Austin, Bureau of Economic Geology, Report of Investigations, no. 234, 89 p.

Hamlin, H. S., Clift, S. J., Dutton, S. P., Hentz, T. F., and Laubach, S. E., 1995, *Canyon sandstones--a geologically complex natural gas play in slope and basin facies, Val Verde Basin, southwest Texas*: The University of Texas at Austin, Bureau of Economic Geology, Report of Investigations, no. 232, 74 p.

Argon, A. S., Cook, N. G. W., Cooper, G. A., Herron, M. M., Laubach, S. E., Maurer, W. C., Monsees, J. E., Pye, D. S., Roegiers, J.-C., Shchukin, E. D., Zoback, M. D., Smeallie, P. H., Usselman, T. M., Crowley, K. D., Estep, J. T., Estep, J. L., Mathis, A. B., Harshman, N. L., Committee on Advanced Drilling Technologies, Geotechnical Board/Commission on Engineering and Technical Systems, Board on Earth Sciences and Resources/Commission on Geosciences, Environment, and Resources, and National Research Council, 1994, *Drilling and excavation technologies for the future*: Washington, D.C., National Academy Press, 161 p.

Nelson, P., and Laubach, S. E., 1994, *Rock mechanics models and measurements, challenges from industry*: Rotterdam, Proceedings of the First North American Rock Mechanics Symposium [236 citations in ISI as of July 2012], 1155 p.

Dutton, S. P., Clift, S. J., Hamilton, D. S., Hamlin, H. S., Hentz, T. F., Howard, W. E., Akhter, M. S., and Laubach, S. E., 1993, *Major low-permeability-sandstone gas reservoirs in the continental United States*: The University of Texas at Austin, Bureau of Economic Geology, Report of Investigations, no. 211, 221 p.

Dutton, S. P., Laubach, S. E., Tye, R. S., Baumgardner, R. W., Jr., and Herrington, K. L., 1991, *Geologic characterization of low-permeability gas reservoirs, Travis Peak Formation, East Texas*: The University of Texas at Austin, Bureau of Economic Geology, Report of Investigations, no. 204, 89 p.

Laubach, S. E., 1989, *Fracture analysis of the Travis Peak Formation, western flank of the Sabine Arch, East Texas*: The University of Texas at Austin, Bureau of Economic Geology, Report of Investigations, no. 185, 55 p.

## Edited Books

Garland, J., Neilson, J. E., Laubach, S. E., and Whidden, K., eds., 2012, *Advances in carbonate exploration and reservoir analysis*: Geological Society of London Special Publication 370, 311 p.

Laubach, S. E., and Tinker, Scott, eds., 2009, *Earth's art: celebrating the Centennial of the Bureau of Economic Geology, 1909-2009*: The University of Texas at Austin, Bureau of Economic Geology, 142 p.

Nelson, Priscilla, and Laubach, S. E., 1994, *Rock mechanics models and measurements, challenges from industry*: Rotterdam, Proceedings of the First North American Rock Mechanics Symposium, 1155 p.

## Non Peer Reviewed Journal Articles

Wang, Q., Narr, W., and Laubach, S. E., 2020, Characterizing subsurface fracture spatial distribution in the East Painter Reservoir anticline, Wyoming: Unconventional Resources Technology Conference, no. URTeC-3265, 12 p., <http://doi.org/10.15530/urtec-2020-3265>.

Gale, J. F. W., Elliott, S. J., and Laubach, S. E., 2018, Hydraulic fractures in core from stimulated reservoirs: core fracture description of HFTS slant core, Midland Basin, West Texas: URTeC paper no. 2902624, 18 p., <http://doi.org/DOI 10.15530/urtec-2018-2902624>.

Laubach, S. E., 2018, Editorial: Spatial arrangement of faults and opening-mode fractures: *Journal of Structural Geology*, v. 108, p. 1, <http://doi.org/10.1016/j.jsg.2018.01.008>.

Laubach, S. E., 2018, Photograph of the Month: Bed-normal opening-mode fractures in Flathead Sandstone: *Journal of Structural Geology*, v. 108, p. iii, [http://doi.org/10.1016/S0191-8141\(18\)30051-8](http://doi.org/10.1016/S0191-8141(18)30051-8).

Laubach, S. E., Olson, J. E., and Lander, R. H., 2017, Cracking the puzzle of rock fracture with crystal clues: *Scientia*, <http://doi.org/10.26320/SCIENTIA44>.

Ramos, M. J., Espinoza, D. N., Spikes, K., Torres-Verdin, C., and Laubach, S. E., 2017, Stress-dependent dynamic-static transforms of anisotropic Mancos Shale: American Rock Mechanics Association (ARMA), 51st U.S. Rock Mechanics/Geomechanics Symposium, ARMA-2017-0182.

Olson, J. E., and Laubach, S. E., 2014, Introduction to this special section: hydrofracturing--modern and novel methods: *The Leading Edge*, v. 33, no. 10, p. 1088, <http://doi.org/10.1190/tle33101088.1>.

Fall, A., Eichhubl, P., and Laubach, S. E., 2013, Timing and processes of fracture formation in tight-gas sandstone reservoirs using fluid inclusions: Proceedings of the Unconventional Resources Technology Conference (URTeC), Denver, Colorado, USA, no. SPE-168833-MS, 6 p., <http://doi.org/10.1190/URTEC2013-173>.

Fall, A., Eichhubl, Peter, and Laubach, S. E., 2013, Timing and Processes of Fracture Formation in Tight-Gas Sandstone Reservoirs Using Fluid Inclusions: Proceedings of the Unconventional Resources Technology Conference (URTeC) Denver, Colorado, USA, 12-14 August, URTeC Control ID Number: 1582124, 6 p.

Fall, A., Eichhubl, Peter, and Laubach, S. E., 2013, Timing and processes of fracture formation in tight-gas sandstone reservoirs using fluid inclusions: Unconventional Resources Technology Conference (URTeC), Denver, Colorado, USA, 12-14 August 2013, URTeC Control ID 1582124.

Fall, A., Eichhubl, Peter, and Laubach, S. E., 2013, Timing and processes of fracture formation in tight-gas sandstone reservoirs using fluid inclusions: Unconventional Resources Technology Conference, Denver, Colorado, USA, 12-14 August 2013, URTeC Control ID 1582124.

Laubach, S. E., 2013, Petroleum structure and geomechanics division-a new technical division for the future! *The Delegate's Voice: Newsletter for the House of Delegates of AAPG*, February, p. 4.

Pommer, L., Gale, J. F. W., Eichhubl, P., Fall, A., and Laubach, S. E., 2013, Using structural

diagenesis to infer the timing of natural fractures in the Marcellus Shale: Proceedings of the Unconventional Resources Technology Conference (URTeC), Denver, Colorado, USA, no. SPE-168770-MS, 6 p., <http://doi.org/10.1190/URTEC2013-167>.

Pommer, L., Gale, Julia F. W., Eichhubl, Peter, Fall, A., and Laubach, S. E., 2013, Using structural diagenesis to infer the timing of natural fractures in the Marcellus Shale: Proceedings of the Unconventional Resources Technology Conference (URTeC) Denver, Colorado, USA, 12-14 August, URTeC Control ID Number: 1580135, 6 p.

Beaumont, T., and Laubach, S. E., 2012, Fostering AAPG science: AAPG Explorer, v. 33, no. 8, p. 3?-4.

Laubach, S. E., 2012, Elected Editor's report: AAPG Bulletin, v. 96, no. 12.

Laubach, S. E., 2012, Fellowship recognizes Bulletin editors: AAPG Explorer, v. 33, no. 4 (April), p. 78-79.

Laubach, S. E., 2012, Fractured fluvial sandstones. Cover photograph: AAPG Bulletin, v. 96, no. 1.

Weimer, P., Laubach, S. E., and Beaumont, T., 2012, Welcome to the new, new digital world: AAPG Explorer, v. 33, no. 4 (April), p. 3.

Hooker, J. N., Laubach, S. E., Kaylor, A., Eichhubl, P., and Fall, A., 2011, Size, spacing, and opening history of natural fractures: preliminary results from the El Alamar Formation, northeastern Mexico: Gulf Coast Association of Geological Societies Transactions, v. 61, p. 233-243.

Laubach, S. E., 2011, Elected Editor's report: AAPG Bulletin, v. 95, no. 12, p. 2121-2123.

Hooker, J. N., and Laubach, S. E., 2010, Using empirical trends in fracture size-frequency data to constrain subsurface fracture abundance, in 44th U.S. Rock Mechanics Symposium and 5th U.S.-Canada Rock Mechanics Symposium Proceedings, Salt Lake City, June 27-30: ARMA 10-325, 11 p.

Laubach, S. E., 2010, Elected Editor's report: AAPG Bulletin, v. 95, no. 12, p. 1888-1889.

Laubach, S. E., 2010, Photograph of the month: fracture with crack-seal texture and porosity, depth 6274 m, Wyoming Journal of Structural Geology, v. 32, p. 1865.

Laubach, S. E., Olson, J. E., Eichhubl, P., Fomel, S. B., and Marrett, R. A., 2010, Natural fractures from the perspective of diagenesis: CSEG Recorder, September, p. 26-31.

Olson, J. E., Laubach, S. E., and Eichhubl, P., 2010, Estimating natural fracture producibility in tight gas sandstones: The Leading Edge, v. 29, no. 12, p. 1494-1499.

Gale, J. F. W., and Laubach, S. E., 2009, Natural fractures in the New Albany Shale and their importance for shale-gas production, in 2009 International Coalbed & Shale Gas Symposium.

Laubach, S. E., 2009, NW Highlands, Scotland, in Laubach, S. E., and Tinker, S. W., eds., 2009, Earth's art: celebrating the Centennial of the Bureau of Economic Geology, 1909-2009: The University of Texas at Austin, Bureau of Economic Geology, p. 30-31.

Laubach, S. E., and Tinker, S. W., 2009, 1909-2009 Century mark: Bureau of Economic Geology going strong after 100 years of service, in The University of Texas at Austin Jackson School of Geosciences Newsletter, p. 64-67.

Laubach, S. E., Olson, J., and Eichhubl, Peter, 2009, Fracture diagenesis and producibility in tight gas sandstones, in Carr, T., D'agostino, T., Ambrose, W., Pashin, J., and Rosen, N. C., eds. Unconventional energy resources: making the unconventional conventional: 29th Annual GCSSEPM Foundation Bob F. Perkins Research Conference, December 6-8, Houston, p. 483-499.

Laubach, S. E., 2008, Applications of cathodoluminescence imaging to the study of sedimentary

rocks by S. Boggs Jr. and D. Kinsley, 2006, ix + 165 p.: Cambridge, NY, Cambridge University Press: a review: *Geological Magazine*, v. 145, no. 4, p. 605-606.

Laubach, S. E., 2008, Integration and teamwork in fracture research: Bureau of Economic Geology Annual Report, p. 8-9.

Hooker, J. N., and Laubach, S. E., 2007, The geologic history of quartz grains, as revealed by color SEM-CL: *Gulf Coast Association of Geological Societies Transactions*, v. 57, p. 375-386.

Marrett, Randall, Laubach, S. E., and Olson, J. E., 2007, Anisotropy and beyond: geologic perspectives on geophysical prospecting for natural fractures: *The Leading Edge*, v. 26, no. 9, 1106-1111. Reprinted in: AAPG Getting Started Series No. 13, *Fractured Reservoirs*, 2008.

Laubach, S. E., Olson, J. E., Eichhubl, P., and Lander, R. H., 2006, Accurate and verifiable interwellbore fracture attribute predictions, in *Proceedings, European Association of Geoscientists & Engineers, 68th EAGE Conference & Exhibition, June 12-15, Vienna, Austria, CD-ROM* [4 p.].

Ortega, O. J., Marret, R., and Laubach, S. E., 2006, A scale-independent approach to fracture intensity and average fracture spacing: *AAPG Bulletin*, v. 9, no. 2, p. 193-208, AAPG Notable Paper for 2006.

Pinzon, E. A., Ortiz, A., and Laubach, S. E., 2006, New techniques on fracture pattern characterization: an example of comparison between Jurassic Nugget Sandstones (Utah Rocky Mountains) and Eocene Mirador Formation sandstones (Colombia Llanos Foothills Basin), in *Asociacin Colombiana de Gelogos y Geofisicos del Petroleo (ACGGP)*, p. 4.

Olson, J. E., Laubach, S. E., and Lander, R. H., 2004, Improving fracture permeability prediction by combining geomechanics and diagenesis, in *6th North America Rock Mechanics Symposium, Rock mechanics across borders and disciplines, June 5-9, Houston: ARMA/NARMS 04-563, CD-ROM* [9 p].

Gale, Julia F. W., Laubach, S. E., Reed, R. M., Moros Otero, J. G., and Gomez, L. A., 2002, Fracture analysis of Clear Fork outcrops in Apache Canyon and cores from South Wason Clear Fork field, in *Integrated outcrop and subsurface studies of the interwell environment of carbonate reservoirs: Clear Fork (Leonardian-age) reservoirs, West Texas and New Mexico: The University of Texas at Austin, Bureau of Economic Geology, final technical report prepared for U.S. Department of Energy under contract no. DE-AC26-98BC15105*, p. 191-226.

Hooker, John N., Marrett, Randall, and Laubach, S. E., 2002, Timing of faults and extension fractures in the Sierra Madre Oriental, northeastern Mexico: *Gulf Coast Association of Geological Societies Transactions*, v. 52, p. 421-428.

Laubach, S. E., Reed, R. M., Gale, J. F. W., Ortega, Orlando, and Doherty, Eloise, 2002, Fracture characterization based on microfracture surrogates, Pottsville Sandstone, Black Warrior Basin, Alabama: *Gulf Coast Association of Geological Societies Transactions*, v. 52, p. 585-596.

Philip, Z. G., Jennings, J. W., Jr., Olson, J., Laubach, S. E., and Holder, Jon, 2002, Modeling coupled fracture-matrix fluid flow in geomechanically simulated fracture networks, in *Proceedings, Conference on Naturally Fractured Reservoirs, Oklahoma City, June 3-4: Mewbourne School of Petroleum and Geological Engineering, University of Oklahoma, Oklahoma Geological Survey, 15 p., CD-ROM*

Rijken, Peggy, Holder, Jon, Olson, J., and Laubach, S. E., 2002, Predicting fracture attributes in the Travis Peak Formation using quantitative mechanical modeling and structural diagenesis: *Gulf Coast Association of Geological Societies Transactions*, v. 52, p. 837-847.

Gomez, L. A., Gale, J. F. W., Ruppel, S. C., and Laubach, S. E., 2001, Fracture characterization using rotary-drilled sidewall cores: an example from the Ellenburger Formation, West Texas, in *Proceedings, West Texas Geological Society Fall Meeting, WTGS Publication 01-110*, p. 81-89.

Laubach, S. E., Reed, R. M., Olson, J., Ortega, Orlando, and Gale, J. F. W., 2001, Fracture-surrogate analysis methods applied to Spraberry, Bone Spring, and "Canyon" cores: preliminary results, in The Permian Basin: microns to satellites, looking for oil and gas at all scales: West Texas Geological Society Fall Symposium, West Texas Geological Society Publication 01-110, p. 75-79.

Marrett, Randall, and Laubach, S. E., 2001, Fracturing during burial diagenesis, in Marrett, R., ed., Genesis and controls of reservoir-scale carbonate deformation, Monterrey salient, Mexico: The University of Texas at Austin, Bureau of Economic Geology, Guidebook 28, p. 109-120.

Santiago, F. M., Laubach, S. E., and Marrett, Randall, 2001, Preliminary diagenetic and stable isotope analyses of fractures in the Cupido Formation, Sierra Madre Oriental, in Marrett, R., ed., Genesis and controls of reservoir-scale carbonate deformation, Monterrey salient, Mexico: The University of Texas at Austin, Bureau of Economic Geology, Guidebook 28, p. 83-105.

Stowell, J. F. W., Laubach, S. E., and Olson, J., 2001, Effect of modern state of stress on flow-controlling fractures: a misleading paradigm in need of revision, in Elsworth, D., Tinucci, J. P., and Heasley, K. A., eds., Rock mechanics in the national interest: Proceedings, 38th Annual U.S. Rock Mechanics Symposium - Balkema, v. 1, p. 691-698.

Laubach, S. E., Marrett, R., and Olson, J. O., 2000, New directions in fracture characterization: The Leading Edge, v. 19, no. 7, p. 704-711. Reprinted in Thomasson, M. R., and Lawyer, L. C., eds., Geologic Columns of The Leading Edge: Society of Exploration Geophysicists, p. 103-107, 2003.

Laubach, S. E., Marrett, Randall, and Olson, J., 2000, New directions in fracture characterization: The Leading Edge, v. 19, no. 7, p. 704-711.

Laubach, S. E., and Burns, Sara, 1998, Virtual Collaboratory(TM), Frac City(TM), facilitates geoscientific collaboration and technology transfer, in Proceedings, GIS: Geoscience Information Society, p. 111-115.

Olson, J., Hennings, P. H., and Laubach, S. E., 1998, Integrating wellbore data and geomechanical modeling for effective characterization of naturally fractured reservoirs: EUROCK '98, Society of Petroleum Engineers, p. 475-485.

Laubach, S. E., and Milliken, K. L., 1996, New fracture characterization methods for siliciclastic rocks, in Aubertin, Michel, Hassani, Ferri, and Mitri, Hani, eds., Rock mechanics: tools and techniques: Proceedings of the 2nd North American Rock Mechanics Symposium: Rotterdam, A. A. Balkema, v. 2, p. 1209-1213.

Reynolds, S. J., Spencer, L., Laubach, S. E., Peacock, S. S., Richard, S. M., and Cunningham, D., 1996, Geologic setting of mineral deposits of the Granite Wash Mountains, La Paz County, west-central Arizona, in Rehrig, W. A., ed., Tertiary extension and mineral deposits, southwestern U.S.: Society of Exploration Geologists Guidebook Series, v. 25, p. 141-155.

Baek, Hwanjo, Laubach, S. E., and Nelson, P., 1994, Fracture toughness and crack morphology of a variably cemented sandstone, in SEM (Society for Experimental Mechanics) Spring Conference and Exhibits: Baltimore, Society for Experimental Mechanics, p. 153-158.

Laubach, S. E., and Hamlin, H. S., 1994, Geological analyses of tight gas sandstones: Canyon Sandstone: In Focus--Tight Gas Sands, v. 10, no. 1, p. 35-38.

Laubach, S. E., and Tremain, C. M., 1994, Fracture swarms: potential targets for methane exploration in Upper Cretaceous sandstone and coal, northern San Juan Basin, Colorado, in Ayers, W. B., Jr., and Kaiser, W. R., eds., Coalbed methane in the Upper Cretaceous Fruitland Formation, San Juan Basin, New Mexico and Colorado: New Mexico Bureau of Mines and Mineral Resources Bulletin 146, published in cooperation with The University of Texas at Austin, Bureau of Economic Geology, Report of Investigations No. 218, and Colorado Geological Survey, Division of Minerals and Geology, Department of Natural Resources, Series 31, p. 106-118.



Nance, H. S., Laubach, S. E., and Dutton, A. R., 1994, Fault and joint measurements in Austin Chalk, Superconducting Super Collider site, Texas: Gulf Coast Association of Geological Societies Transactions, v. 44, p. 521-532.

Dutton, S. P., and Laubach, S. E., 1993, Comprehensive geologic basin analysis: application of a generic research approach to several tight gas sandstone formations: In Focus--Tight Gas Sands, v. 9, no. 1, p. 1-33.

Tyler, Roger, Laubach, S. E., Ambrose, W. A., Tremain, C. M., and Grout, M. A., 1993, Coal fracture patterns in the foreland of the Cordilleran thrust belt, western United States, in Proceedings, International Coalbed Methane Symposium, v. 1: Paper 9379, p. 695-704.

Clift, S. J., Laubach, S. E., and Holder, Jon, 1992, Strength anisotropy in low-permeability sandstone gas reservoir rocks: application of the axial point-load test: Gulf Coast Association of Geological Societies Transactions, v. 42, p. 61-72.

Collins, E. W., Laubach, S. E., and Dutton, S. P., 1992, Geology of the Davis sandstone, in Investigation of the Davis sandstone (Fort Worth Basin, Texas) as a suitable formation for the GRI hydraulic fracture test site: S. A. Holditch and Associates Data Well No. 1, Wise County, Texas: CER Corporation, topical report prepared for Gas Research Institute under contract no. 5091-221-2130, GRI-92/0194, p. 4-12.

Collins, E. W., Laubach, S. E., Dutton, S. P., and Hill, R. E., 1992, Depositional environments, petrology, and fractures of the Atoka Davis Sandstone: a low-permeability gas-bearing sandstone of the Fort Worth Basin, North-Central Texas: Southwest Section, American Association of Petroleum Geologists Transactions, Publication SWS 92-90, p. 221-230.

Dutton, S. P., Hamlin, H. S., and Laubach, S. E., 1992, Geological analysis of the Frontier Formation, in CER Corporation, ed., Staged field experiment no. 4: application of advanced technologies in tight gas sandstones--Frontier Formation, Chimney Butte field, Sublette County, Wyoming: CER Corporation, report prepared for the Gas Research Institute under contract report no. GRI-92/0394, p. 25-51.

Laubach, S. E., 1992, Advancements in hydraulic fracture azimuth research, Green River Basin, Wyoming: In Focus--Tight Gas Sands, v. 8, no. 2, p. 12-22.

Laubach, S. E., 1992, Identifying key reservoir elements in low-permeability sandstones: natural fractures in the Frontier Formation, southwestern Wyoming: In Focus--Tight Gas Sands, v. 8, no. 2, p. 3-11.

Laubach, S. E., and Lorenz, J. C., 1992, Preliminary assessment of natural fracture patterns in Frontier Formation sandstones, southwestern Wyoming, in Mullen, C. E., ed., Rediscover the Rockies: Wyoming Geological Association, 43rd Field Conference Guidebook, p. 87-96.

Laubach, S. E., Clift, S. J., Hill, R. E., and Jix, J., 1992, Stress directions in Cretaceous Frontier Formation, Green River Basin, Wyoming, in Mullen, C. E., ed., Rediscover the Rockies: Wyoming Geological Association, Forty-Third Field Conference Guidebook, p. 74-86.

Laubach, S. E., Tyler, Roger, Ambrose, W. A., and Tremain, C. M., 1992, Preliminary map of fracture patterns in coal in the western United States, in Fractured and jointed rock masses: International Society for Rock Mechanics, v. 1, p. 183-190.

Tyler, Roger, Kaiser, W. R., Ambrose, W. A., Scott, A. R., Laubach, S. E., and Ayers, W. B., Jr., 1992, Coalbed methane characteristics in the foreland of the Cordilleran thrust belt, western United States, in Beamish, B. B., and Gamson, P. D., eds., Symposium on coalbed methane research and development in Australia: Coalseam Gas Research Institute, James Cook University of North Queensland, v. 2, p. 11-32.

Dutton, S. P., Laubach, S. E., and Tye, R. S., 1991, Depositional, diagenetic, and structural controls on reservoir properties of low-permeability sandstone, Travis Peak Formation, East Texas: Gulf Coast Association of Geological Societies Transactions, v. 41, p. 209-220.

Laubach, S. E., and Collins, E. W., 1991, Fracture geometry and fracture intensity associated with faults and folds in the Austin Chalk and other Cretaceous limestones of Central Texas, in Chuber, Stewart, ed., *Geology, geophysics and formation evaluation: Austin Chalk exploration symposium*: South Texas Geological Society, Abstracts and Short Papers, p. 77-80.

Laubach, S. E., and Tremain, C. M., 1991, Regional coal fracture patterns and coalbed methane development, in Roegiers, J.-C., ed., *Rock mechanics as a multidisciplinary science: Proceedings of the 32nd U.S. Symposium*, The University of Oklahoma at Norman: Rotterdam, A. A. Balkema, p. 851-859.

Collins, E. W., Laubach, S. E., and Vendeville, B. C., 1990, Faults and fractures in the Balcones Fault Zone, Austin Region, Central Texas, in Collins, E. W., and Laubach, S. E., coordinators, *Faults and fractures in the Balcones Fault Zone, Austin Region, Central Texas*: Austin Geological Society, Guidebook 13, p. 1-28.

Richard, S. M., Laubach, S. E., Reynolds, S. J., and Spencer, L., 1990, Mesozoic thrusting, synplutonic deformation, and Miocene overprinting, Harcuvar Complex: a section through the pre-Tertiary crust of west-central Arizona, in Gehrels, G. E., and Spencer, J. E., eds., *Geologic excursions through the Sonoran Desert region, Arizona and Sonora*: Arizona Geological Survey Special Paper 7, p. 66-75.

Tye, R. S., Dutton, S. P., Herrington, K. L., and Laubach, S. E., 1989, The role of geology in characterizing low-permeability sandstones, North Appleby field, East Texas Basin, in *Society of Petroleum Engineers Proceedings, SPE Joint Rocky Mountain Regional/Low Permeability Reservoirs Symposium and Exhibition*, Paper No. 18964, p. 355-365.

Tye, R. S., Dutton, S. P., Laubach, S. E., and Finley, R. J., 1989, Geologic analysis of the Travis Peak tight gas sandstones: In *Focus--Tight Gas Sands*, v. 6, no. 1, p. 63-69.

Fracasso, M. A., Laubach, S. E., Baumgardner, R. W., Jr., and Finley, R. J., 1988, Geological analysis of the Travis Peak Formation, in CER Corporation and S. A. Holditch and Associates, compilers and eds., *Advancements in Travis Peak Formation evaluation and hydraulic fracture technology: Staged Field Experiment No. 1, Waskom field, Harrison County, Texas*: The University of Texas at Austin, Bureau of Economic Geology, topical report prepared for the Gas Research Institute report no. GRI-88/0077, p. 35-62.

Jackson, M. L. W., and Laubach, S. E., 1988, Cretaceous and Tertiary compressional tectonics as the cause of the Sabine Arch, East Texas and northwest Louisiana: *Gulf Coast Association of Geological Societies Transactions*, v. 38, p. 245-256.

Laubach, S. E., and Monson, E. R., 1988, Coring-induced fractures: indicators of hydraulic fracture propagation in a naturally fractured reservoir, in *Proceedings, Society of Petroleum Engineers Annual Technical Conference and Exhibition*, SPE Paper No. 18164, p. 587-596.

Laubach, S. E., Baumgardner, R. W., Jr., Monson, E. R., Hunt, E., and Meador, K. J., 1988, Fracture detection in low-permeability reservoir sandstone: a comparison of BHTV and FMS logs to core, in *Proceedings, Society of Petroleum Engineers Annual Technical Conference and Exhibition*, SPE Paper No. 18119, p. 129-139. Reprinted in *Borehole imaging*: Society of Professional Well Log Analysts, SPWLA Reprint Series, p. 265-275 (1990).

Spencer, J. E., Reynolds, S. J., Anderson, J. L., Davis, G. A., Laubach, S. E., Richard, S. M., and Marshak, S., 1987, Field-trip guide to parts of the Harquahala, Granite Wash, Whipple, and Buckskin Mountains, west-central Arizona and southeastern California, in *Geological diversity of Arizona and its margins: excursions to choice areas*: Arizona Bureau of Geology and Mineral Technology Special Paper 5, p. 351-364.

## Non Peer Reviewed Book Chapters

Dutton, S. P., Hamlin, H. S., and Laubach, S. E., 1992, Geological analysis of the Frontier Formation, in in CER Corporation, ed., *Staged field experiment no. 4: application of advanced technologies in tight gas sandstones--Frontier Formation, Chimney Butte field, Sublette County*,

Wyoming: CER Corporation, prepared for the Gas Research Institute, contract report no. GRI-92/0394, p. 25-90.

Laubach, S. E., and Hamlin, H. S., 1992, Stop No. 1--East-facing sandstone flatiron, SW SE section 35, T. 24N, R. 116W, between Wheat and West Willow Creeks and Stop No. 4--Fractures in the Frontier Formation, in Sundell, K. A., and Anderson, T. C., eds., Road log volume for Rediscover the Rockies: Wyoming Geological Association, AAPG-SEPM-EMD Rocky Mountain Section Meeting, p. 111-112 and p. 105-107.

### Non Peer Reviewed Atlases and Maps

Laubach, S. E., 1994, Tectonic map of Texas: The University of Texas at Austin, Bureau of Economic Geology, 1 sheet + text, scale 1 inch = ~100 mi.

Reynolds, S. J., Spencer, J. E., Laubach, S. E., Cunningham, D., and Richard, S. M., 1991, Geologic map and sections of the Granite Wash Mountains, west-central Arizona: Arizona Geological Society, Map 30, 1 sheet, scale 1:24,000.

Reynolds, S. J., Spencer, J. E., Laubach, S. E., Cunningham, D., and Richard, S. M., 1989, Geologic map, geologic evolution, and mineral deposits of the Granite Wash Mountains, west-central Arizona: Arizona Geological Survey, Open-File Report 89-04, scale 1:24,000.

### Guidebooks

Collins, E. W., and Laubach, S. E., 1990, Faults and fractures in the Balcones Fault Zone, Austin Region, Central Texas: Austin Geological Society Guidebook 13, 34 p.

### Conference Proceedings

Forstner, S., Corrêa, R., Wang, Q., and Laubach, S. E., 2025, Fracture length data for geothermal applications, Powering the energy transition through subsurface collaboration: proceedings of the 1st Energy Geoscience Conference, Energy Geoscience Conference Series, v. 1, London, 19 p.

Haddad, M., Eichhubl, P., and Laubach, S. E., 2019, Threshold Horizontal Stress Contrast for Fully Cemented Natural-Fracture Reactivation: Dependence on Intersection Angle and Initial Reservoir Pressure, 53rd U.S. Rock Mechanics/Geomechanics Symposium, New York, N.Y.

Gale, J. F. W., Ukar, E., and Laubach, S. E., 2018, Gaps in DFN models and how to fill them, 2nd International Discrete Fracture Network Engineering Conference, American Rock Mechanics Association, no. DFNE 18-857, Seattle, Wash., 9 p.

Ukar, E., Lopez, R. G., Fall, A., Manceda, R., Gale, J. F. W., and Laubach, S. E., 2017, Vertical fractures and a new type of kinematic indicator in bed-parallel veins (beef) at Arroyo Mulichinco, Neuquen Basin, XX Congreso Geológico Argentino, 3 p.

### Book Reviews

Laubach, S. E., 2008, Review of Applications of cathodoluminescence imaging to the study of sedimentary rocks by S. Boggs Jr. and D. Kinsley, 2006, ix + 165 p.: Cambridge, NY, Cambridge University Press: a review: Geological Magazine, v. 145, no. 4, p. 605-606. Invited review.

Laubach, S. E., 1991, Review of The Highlands Controversy, Constructing Geological Knowledge through Fieldwork in Nineteenth-Century Britain, by David R. Oldroyd: Journal of Geological Education, v. 39, p. 346-347. Invited review.

### Contract Reports

Gale, J. F. W., Elliott, S. J., and Laubach, S. E., 2017, Fracture Characterization. Subcontract S5 for GTI Project No. 21686: Hydraulic Fracture Test Site (HFTS): Final Report.

Fall, A., Laubach, S. E., Elliott, S. J., and Ukar, E., 2015, Fractures in Devonian sandstone reservoirs, Subandean fold and thrust belt, Northern Bolivia: Final Report prepared for TOTAL,

France, 59 p.

Laubach, S. E., 2015, Predicting fracture porosity evolution in sandstone: Final Report prepared for Chemical Sciences, Geosciences and Biosciences Division, Office of Basic Energy Sciences, Office of Science, under contract no. (grant no.) DE-FG02-03ER15430, 103 p.

Laubach, S. E., 2013, Predicting fracture porosity evolution in sandstone: The University of Texas at Austin, Bureau of Economic Geology, annual report (new renewal grant) prepared for the U.S. Department of Energy, under contract no. DE-FG02-03ER15430, 9 p.

Ukar, E., Eichhubl, Peter, and Laubach, S. E., 2013, Distribution and characteristics of natural fractures in outcrop and core, Nikanassin Formation, Alberta Foothills, Canada: Implications for natural and hydraulic fracture interaction: Shell / UT Unconventional Research, Interim Report, SUTUR Task 5, 91 p + figures and tables.

Hooker, J. N., Laubach, S. E., Weisenberger, T., Olson, J., and Holder, J., 2012, Microstructure and diagenesis of Lajas Formation core samples, Neuquen Basin: The University of Texas at Austin, Bureau of Economic Geology, Fracture Research and Application Consortium, report prepared for YPF, 38 p.

Laubach, S. E., Olson, J. E., Lander, R. H., Eichhubl, P., and Bonnell, L. M., 2012, Predicting fracture porosity evolution in sandstone: The University of Texas at Austin, Bureau of Economic Geology, final report prepared for the U.S. Department of Energy, under contract no. DE-FG02-03ER15430, 95 p.

Eichhubl, Peter, Fall, Andras, Davis, J. S., and Laubach, S. E., 2010, ExxonMobil--BEG Collaborative on Unconventional Reservoirs, Task 3: Fracture petrography and fluid inclusion analyses: The University of Texas at Austin, Bureau of Economic Geology, Project Year 2, Report 23 prepared for ExxonMobil, 30 p.

Gale, J. F. W., Laubach, S. E., and Fidler, L. J., 2010, New Albany Shale: Bureau of Economic Geology fracture characterization: The University of Texas at Austin, Bureau of Economic Geology, final report prepared for RPSEA and authorized by the U.S. Energy Policy Act of 2005, 42 p.

Laubach, S. E., Lander, R. H., Olson, J. E., Eichhubl, P., Bonnell, L. M., and Marrett, R. A., 2010, Predicting fracture porosity evolution in sandstone: The University of Texas at Austin, Bureau of Economic Geology, annual report prepared for U.S. DOE, Office of Science Program Office: Chemical Sciences, Geosciences, and Bioscience Division, Office of Basic Energy Sciences, under Grant No. DE-FG02-03ER15430, 21 p.

Gale, J. F. W., and Laubach, S. E., 2009, New Albany shale fracture characterization: The University of Texas at Austin, Bureau of Economic Geology, annual report prepared for Research Partnership to Secure Energy in America (RPSEA), under GTI Contract Project No. S-48, 19 p.

Laubach, S. E., Eichhubl, Peter, Fall, Andras, Hooker, J. N., and Davis, J. S., 2009, ExxonMobil--BEG Collaborative on Unconventional Reservoirs, Task 3: Understanding the importance of natural fractures, stress sensitivity, and hydraulic/natural fracture interaction, Project Year 1: The University of Texas at Austin, Bureau of Economic Geology, Project Year 1, Report 13 prepared for ExxonMobil, 25 p.

Hooker, J. N., Eichhubl, Peter, Reed, R. M., and Laubach, S. E., 2006, Wind River Basin study: initial analysis of Tensleep Formation: The University of Texas at Austin, Bureau of Economic Geology, topical report prepared for FRAC Industrial Associates, 13 p.

Laubach, S. E., Lander, R. H., Olson, J. E., Eichhubl, P., Bonnell, L. M., and Marrett, R., 2006, Predicting fracture porosity evolution in sandstone: The University of Texas at Austin, Bureau of Economic Geology, final report prepared for the U.S. Department of Energy, under contract no. DE-FG02-03ER15430, 73 p.

Gale, J. F. W., Hooker, J. N., Laubach, S. E., and Reed, R. M., 2005, Fracture analysis of Frontier Fm. Samples: The University of Texas at Austin, Bureau of Economic Geology, Fracture Research and Application Consortium, case study reports prepared for Shell, 13 p.

Hardage, B. A., Backus, M. M., DeAngelo, M. V., Graebner, R. J., Laubach, S. E., and Murray, Paul, 2004, Combining a new 3-D seismic S-wave propagation analysis for remote fracture detection with a robust subsurface microfracture-based verification technique: The University of Texas at Austin, Bureau of Economic Geology, final report prepared for U.S. Department of Energy, under contract no. DE-AC26-00NT40690, 72 p.

Olson, J. E., Lake, L. W., and Laubach, S. E., 2003, Advanced technology for predicting the fluid flow attributes of naturally fractured reservoirs from quantitative geologic data and modeling: The University of Texas at Austin, Bureau of Economic Geology, annual report for September 29, 2000-September 28, 2001 prepared for U.S. Department of Energy, under contract no. DE-FC26-00BC15308, CD-ROM.

Olson, J. E., Lake, L. W., and Laubach, S. E., 2003, Advanced technology for predicting the fluid flow attributes of naturally fractured reservoirs from quantitative geologic data and modeling: The University of Texas at Austin, Bureau of Economic Geology, annual report for September 29, 2001-September 28, 2002 prepared for U.S. Department of Energy, under contract no. DE-FC26-00BC15308, CD-ROM.

Hardage, B. A., and Laubach, S. E., 2001, Combining a new 3-D seismic S-wave progradation analysis for remote fracture detection with a robust subsurface microfracture-based verification technique: The University of Texas at Austin, Bureau of Economic Geology, Phase I topical report prepared for U.S. Department of Energy, under DOE Program Award No. DE-AC26-00NT40690, 127 p.

Laubach, S. E., Marrett, Randall, Olson, J., and Stowell, J. F. W., 2001, Research, geologic, geophysical, and engineering studies of fractures: report to Fracture Research and Application consortium, unpaginated.

Laubach, S. E., Stowell, J. F. W., and Reed, R. M., 2001, Southeast Green River Basin sidewall core study: preliminary results: The University of Texas at Austin, Bureau of Economic Geology, report prepared for Tom Brown, Inc., 26 p. and CD.

Laubach, S. E., Marrett, Randall, Olson, J., and Stowell, J. F. W., 2000, Applications, geologic, geophysical, and engineering studies of fractures: The University of Texas at Austin, Bureau of Economic Geology, Spring 2000 report prepared to Fracture Research and Application consortium, unpaginated.

Hamilton, D. S., Ambrose, W. A., Barba, R. E., Jr., De Angelo, Michael, Tyler, Noel, Yeh, J. S., Dunlap, D. B., and Laubach, S. E., 1999, Hydrocarbon production opportunities defined by integrated reservoir characterization, Guarico 13/10 Area, eastern Venezuela: The University of Texas at Austin, Bureau of Economic Geology, final report prepared for Teikoku Oil de Sanvi Guere, C.A., 95 p. + app. + attachments.

Laubach, S. E., Marrett, Randall, Rossen, C., Olson, J., Lake, L. W., Ortega, Orlando, Gu, Yaguang, and Reed, R. M., 1999, Using microstructure observations to quantify fracture properties and improve reservoir simulations: The University of Texas at Austin, Bureau of Economic Geology, final report prepared for U.S. Department of Energy, Assistant Secretary for Fossil Energy, under subcontract no. G4S51732, contract DE-AC22-94-PC91008, 493 p.

Guevara, E. H., Fouad, Khaled, Barba, R. E., Jr., Laubach, S. E., Light, M. P. R., and Remington, L. E., 1998, Optimizing hydrocarbon recovery from the Mara Este (Mara Liviano) field, Maracaibo Basin, Venezuela, Phase 1: The University of Texas at Austin, Bureau of Economic Geology, final report prepared for PDVSA EyP, Maracaibo, Venezuela, 28 p. + figs., tables, attachments.

Hardage, B. A., Doherty, Eloise, Laubach, S. E., and Hentz, T. F., 1998, Secondary natural gas

recovery in the Appalachian Basin: application of advanced technologies in a field demonstration site, Henderson Dome, western Pennsylvania: The University of Texas at Austin, Bureau of Economic Geology, final report prepared for U.S. Department of Energy, Federal Energy Technology Center, under subcontract no. 97-305-TBEG, 164 p.

Laubach, S. E., 1998, Facilitation of science and engineering collaboration and technology transfer: The University of Texas at Austin, Bureau of Economic Geology, annual report submitted to BDM-Oklahoma, Inc., under subcontract no. G4S51732, 22 p.

Laubach, S. E., 1998, Using microstructure observations to quantify fracture properties and improve reservoir simulations: The University of Texas at Austin, Bureau of Economic Geology, annual report submitted to BDM-Oklahoma, Inc., under subcontract no. G4S51732, 33 p.

Laubach, S. E., Marrett, Randall, Rossen, William, Olson, J., Lake, L. W., Ortega, Orlando, Gu, Yaguang, and Reed, R. M., 1998, Using microstructure observations to quantify fracture properties and improve reservoir simulations: The University of Texas at Austin, Bureau of Economic Geology, Department of Geological Sciences, and Department of Petroleum and Geosystems Engineering, final report submitted to BDM-Oklahoma, Inc., under subcontract no. G4S51732, 493 p.

Laubach, S. E., 1997, Determination of natural fracture orientation using scanned CI: Natural Fracture Analysis Project: The University of Texas at Austin, Bureau of Economic Geology, confidential progress report prepared for Parker & Parsley, Inc., Midland, Texas, under contract no. NF-004, 9 p.

Laubach, S. E., 1997, Determination of natural fracture orientation using scanned CL: Spraberry test case: The University of Texas at Austin, Bureau of Economic Geology, contract report prepared for Parker & Parsley, Inc., Midland, Texas, 7 p.

Laubach, S. E., Marrett, Randall, and Lake, L. W., 1997, New methods of natural fracture characterization and simulation: The University of Texas at Austin, Bureau of Economic Geology, annual report prepared for U.S. Department of Energy, 195 p. plus attachments.

Laubach, S. E., 1996, Improved resource characterization technology: The University of Texas at Austin, Bureau of Economic Geology, topical report the Gas Research Institute, under contract no. 5082-211-0708, 32 p.

Dickerson, P. W., Hamlin, H. S., Hentz, T. F., and Laubach, S. E., 1995, Regional domains of the Wilcox Lobo natural gas trend, South Texas: The University of Texas at Austin, Bureau of Economic Geology, topical report prepared for Gas Research Institute, under contract no. 5082-211-0708 (GRI 95/0027), 49 p.

Laubach, S. E., Hentz, T. F., Johns, M. K., Baek, Hwanjo, and Clift, S. J., 1995, Using diagenesis information to augment fracture analysis: The University of Texas at Austin, Bureau of Economic Geology, topical report prepared for Gas Research Institute, under contract no. 5082-211-0708 (GRI-94/0455), 189 p.

Laubach, S. E., Clift, S. J., Hamlin, H. S., Dutton, S. P., Hentz, T. F., Baek, Hwanjo, and Marin, B. A., 1994, Geology of a stratigraphically complex natural gas play: Canyon sandstones, Val Verde Basin, southwest Texas: The University of Texas at Austin, Bureau of Economic Geology, topical report prepared for the Gas Research Institute, under contract no. 5082-211-0708, GRI-94/0167, 135 p.

Lorenz, J. C., and Laubach, S. E., 1994, Description and interpretation of natural fracture patterns in sandstones of the Frontier Formation along the Hogsback, southwestern Wyoming: The University of Texas at Austin, Bureau of Economic Geology, topical report prepared for the Gas Research Institute, under contract no. 5089-211-2059, SAND94-0153, 86 p.

Nance, H. S., Laubach, S. E., and Dutton, A. R., 1994, Fault and joint measurements in Austin Chalk, Superconducting Super Collider site, Texas: The University of Texas at Austin, Bureau of Economic Geology, topical report prepared for the Texas National Research Laboratory

Commission, under contract no. IAC(92-93)-0301, 36 p.

Dutton, S. P., Clift, S. J., Hamilton, D. S., Hamlin, H. S., Hentz, T. F., Howard, W. E., Akhter, M. S., and Laubach, S. E., 1993, Atlas of major low-permeability sandstone gas reservoirs in the continental United States: The University of Texas at Austin, Bureau of Economic Geology, topical report prepared for the Gas Research Institute, under contract no. 5082-211-0708, 460 p.

Laubach, S. E., 1993, Increasing development efficiency in low-permeability gas reservoirs: a synopsis of Tight Gas Sands Project research: The University of Texas at Austin, Bureau of Economic Geology, topical report prepared for the Gas Research Institute, under contract no. 5082-211-0708, 71 p.

Dutton, S. P., Hamlin, H. S., and Laubach, S. E., 1992, Geologic controls on reservoir properties of low-permeability sandstone, Frontier Formation, Moxa Arch, southwest Wyoming: The University of Texas at Austin, Bureau of Economic Geology, topical report prepared for the Gas Research Institute, under contract no. 5082-211-0708, 199 p.

Kaiser, W. R., Scott, A. R., Hamilton, D. S., Tyler, Roger, McMurry, R. G., and Laubach, S. E., 1992, Geologic and hydrologic controls on coalbed methane: Sand Wash Basin, Colorado and Wyoming: The University of Texas at Austin, Bureau of Economic Geology, annual report prepared for the Gas Research Institute, under contract no. 5091-214-2261, 108 p.

Ayers, W. B., Jr., Kaiser, W. R., Laubach, S. E., Ambrose, W. A., Baumgardner, R. W., Jr., Scott, A. R., Tyler, Roger, Yeh, J. S., Hawkins, G. J., Swartz, T. E., Schultz-Ela, D., Zellers, S. D., Tremain, C. M., and Whitehead, N. H., III, 1991, Geologic and hydrologic controls on the occurrence and producibility of coalbed methane, Fruitland Formation, San Juan Basin: The University of Texas at Austin, Bureau of Economic Geology, topical report prepared for the Gas Research Institute, under contract no. 5087-214-1544, 314 p.

Laubach, S. E., 1991, Geological analysis of the Travis Peak Formation and Cotton Valley Sandstone, in Staged field experiment no. 3: application of advanced technologies in tight gas sandstones-Travis Peak and Cotton Valley Formation, Waskom field, Harrison County, Texas, reservoirs: CER Corporation and S. A. Holditch and Associates, Inc., contract report prepared for the Gas Research Institute, under contract no. GRI-910048, p. 27-66.

Ayers, W. B., Jr., Kaiser, W. R., Ambrose, W. A., Swartz, T. E., Laubach, S. E., Tremain, C. M., and Whitehead, N. H., III, 1990, Geologic evaluation of critical production parameters for coalbed methane resources: The University of Texas at Austin, Bureau of Economic Geology, annual report prepared for the Gas Research Institute, under contract no. 5087-214-1544, 175 p.

Dutton, S. P., Laubach, S. E., Tye, R. S., Baumgardner, R. W., Jr., and Herrington, K. L., 1990, Geology of the Lower Cretaceous Travis Peak Formation, East Texas--depositional history, diagenesis, structure, and reservoir engineering implications: The University of Texas at Austin, Bureau of Economic Geology, final report prepared for the Gas Research Institute, under contract no. 5082-211-0708, 170 p.

Laubach, S. E., 1990, Mechanics of the segmentation of normal faults: The University of Texas at Austin, Bureau of Economic Geology, final report prepared for the Texas Higher Education Coordinating Board, under contract no. 2174, variously paginated.

Laubach, S. E., Hamlin, H. S., Buehring, R., Baumgardner, R. W., Jr., and Monson, E. R., 1990, Application of borehole-imaging logs to geologic analysis, Cotton Valley Group and Travis Peak Formation, GRI Staged Field Experiment Wells, East Texas: The University of Texas at Austin, Bureau of Economic Geology, topical report prepared for the Gas Research Institute, under contract no. 5082-211-0708, 115 p.

Ayers, W. B., Jr., Kaiser, W. R., Ambrose, W. A., Swartz, T. E., Laubach, S. E., Tremain, C. M., and Whitehead, N. H., III, 1989, Geologic evaluation of critical production parameters for

coalbed methane resources: San Juan Basin: The University of Texas at Austin, Bureau of Economic Geology, final report prepared for the Gas Research Institute, under contract no. 5087-214-1544, 171 p.

Baumgardner, R. W., Jr., Tye, R. S., Laubach, S. E., Diggs, T. N., Herrington, K. L., and Dutton, S. P., 1988, Site selection for GRI cooperative tight gas field research, volume II: geologic characteristics of selected low-permeability gas sandstones: The University of Texas at Austin, Bureau of Economic Geology, topical report prepared for the Gas Research Institute, under contract no. 5082-211-0708, 225 p.

Laubach, S. E., Baumgardner, R. W., Jr., and Meador, K. J., 1987, Analysis of natural fractures and borehole ellipticity, Travis Peak Formation, East Texas: The University of Texas at Austin, Bureau of Economic Geology, topical report prepared for the Gas Research Institute, under contract no. 5082-211-0708, 128 p.

## Course Notes

Laubach, S. E., and Gale, J. F. W., 2005, Devon Canada Short Course: Geological, Geophysical, and Engineering Studies of Fractures in Reservoirs and Reservoir Analogs: The University of Texas at Austin, Bureau of Economic Geology, unpaginated.

Laubach, S. E., and Stowell, J. F. W., 2001, Short course, Natural Fracture Reservoir Quality Prediction and Diagenesis: Jackson, Mississippi, Petroleum Technology Transfer Council, Eastern Gulf Region, unpaginated.

Laubach, S. E., Lander, R., and Bonnell, L., 2001, Predicting reservoir quality using diagenetic models: Petroleum Technology Transfer Council, South Texas Geological Society, unpaginated.

Laubach, S. E., Marrett, Randall, and Olson, J., 2000, Short course, AAPG Fractured Reservoir Characterization and Modeling: American Association of Petroleum Geologists, unpaginated.

Laubach, S. E., Stowell, J. F. W., Ortega, O.O., and Doherty, E., 1999, Core Fracture Workshop: The University of Texas at Austin, Bureau of Economic Geology, AAPG Fractured Reservoir and Modeling School, 58 p.

Marrett, R. A., Laubach, S. E., and Stowell, J. F. W., 1999, Fractures in Central Texas: issues in fracture characterization: The University of Texas at Austin, Bureau of Economic Geology, Notes for BPAmoco Workshop, 12 p. plus attachments.

Laubach, S. E., 1996, New methods to quantify natural fracture attributes: Notes for Geological Society of America Workshop, March 13, 1996, 23 p.

Marrett, Randall, and Laubach, S. E., 1996, Fractures in Central Texas: The University of Texas at Austin, Department of Geological Sciences, guide for field course, 23 p. plus appendices.

Laubach, S. E., and Martel, S. M., 1994, Characterization of natural fracture patterns with special emphasis on scale and time effects, bound notes for Workshop 2--Natural Fracture Characterization: The University of Texas at Austin, North American Rock Mechanics Symposium, May 31, 1994, Austin, Texas, 93 p.

## Published Reports

Jackson, M. L. W., and Laubach, S. E., 1991, Structural history and origin of the Sabine Arch, East Texas and northwest Louisiana: The University of Texas at Austin, Bureau of Economic Geology, Geological Circular, no. 91-3, 47 p.

Finley, R. J., Laubach, S. E., Tyler, Noel, and Holtz, M. H., 1990, Opportunities for horizontal drilling in Texas: The University of Texas at Austin, Bureau of Economic Geology, Geological Circular, no. 90-2, 32 p.

Reynolds, S. J., Spencer, L., Laubach, S. E., Cunningham, D., and Richard, S. M., 1989, Geologic map, geologic evolution, and mineral deposits of the Granite Wash Mountains, west-central Arizona: Arizona Geological Survey, Open-File Report, no. 89-4, 44 p.



## Workshop Workbooks

Behr, W., Daigle, H., Hayman, N., Laubach, S. E., Milliken, K., and Prodanovic, M., 2016, Deformation at the Scale of Fundamental Rock Components: A Scale that Matters for Prediction: University of Wisconsin-Madison-hosted NSF-sponsored workshop, Compilation of Idea White Papers, Future Directions in Structural Geology and Tectonics Workshop, <https://sgtfuturedirections.wordpress.com/idea-paper/>, 7-9 p.

Laubach, S. E., Milliken, K. L., Marrett, R. A., and Wright, P., 1996, Methods to quantify natural fracture attributes: sponsored by the Gas Research Institute, Austin, Texas, March.

## Computer Applications and Internet

Laubach, S. E., 2013, Structural diagenesis website: <http://www.jsg.utexas.edu/sdi/index.html>: .

Laubach, S. E., and Burns, S., 1998, Virtual Collaboratory(TM), Frac City(TM), facilitates geoscientific collaboration and technology transfer, in Proceedings, GIS: Geoscience Information Society, p. 111-115. Associated website software operational from ca. 1997 to 2000.: Geoscience Information Society.

## Published Abstracts

Gale, J. F. W., Elliott, S. J., and Laubach, S. E., 2019, Direct observation of hydraulic fractures in the Hydraulic Fracture Test Site (HFTS) slant core, Reagan Co., Midland Basin, Texas: insights into distribution, morphology, intensity and interaction with natural discontinuities (ext. abs.): Canadian Society of Petroleum Geologists (CSPG) William C. Gussow Geoscience Conference, Banff, Canada, October 15-17, 6 p.

Gale, J. F. W., Elliott, S. J., Li, J. Z., and Laubach, S. E., 2019, Natural fracture characterization in the Wolfcamp Formation at the Hydraulic Fracture Test Site (HFTS), Midland Basin, Texas (ext. abs.): Proceedings of the Unconventional Resources Technology Conference (URTeC), Denver, Colo., no. 644, 16 p., <http://doi.org/10.15530/urtec-2019-644>.

Gale, J., Fall, A., Ali, W., Laubach, S., Eichhubl, P., and Bodnar, R., 2019, Opening-mode fracturing and cementation timing in the Barnett Shale, Delaware Basin, West Texas (abs.): 2019 AAPG Annual Convention and Exhibition, San Antonio, Tex., May 19-22, 1 p.

Laubach, S. E., Wang, Q., Forstner, S. R., and Hooker, J. N., 2019, Chemical effects on opening-mode fracture size and spatial arrangement (abs.): Geological Society of America Abstracts with Programs, v. 51, no. 5, 1 p., <http://doi.org/10.1130/abs/2019AM-338802>.

Wang, Q., Laubach, S. E., and Gale, J. F. W., 2019, Quantifying natural fracture clustering in basement rock: application of Normalized Correlation Count method (abs.): American Geophysical Union Fall Meeting 2019, San Francisco, Calif., Dec. 9-13, abs. no. H41H-1792, 1 p.

Wang, Q., Laubach, S. E., Gale, J. F. W., and Ramos, M. J., 2019, Quantified fracture (joint) clustering in Archean Basement, Wyoming: application of Normalized Correlation Count method (abs.): 2019 AAPG Annual Convention and Exhibition, San Antonio, Tex., May 19-22, 1 p.

Gale, J. F. W., Elliott, S. J., and Laubach, S. E., 2018, Hydraulic fractures in core from stimulated reservoirs: core fracture description of HFTS slant core, Midland Basin, West Texas (abs.): Proceedings of the Unconventional Resources Technology Conference (URTeC), Houston, Tex., no. 2902624, 18 p., <http://doi.org/10.15530/urtec-2018-2902624>.

Baques, V., Ukar, E., Zhang, L., Yuan, W., Laubach, S. E., Forstner, S., Fall, A., and Sun, C., 2017, Decameter-scale bit drops at 7 km depth in the Yijianfang Formation, Halahatang Oilfield, Tarim Basin, China: fault-related deep-seated dissolution (abs.): Geological Society of America Abstracts with Programs, v. 49, no. 6, <http://doi.org/doi:10.1130/abs/2017AM-305841>.

Eichhubl, P., and Laubach, S. E., 2017, Structural diagenesis of natural fractures: implications for water, energy, environment, and hazards (abs.): Geological Society of America Abstracts

with Programs, v. 49, no. 6, <http://doi.org/10.1130/abs/2017AM-302739>.

Fall, A., Ukar, E., Lopez, R. G., Gale, J. F. W., Manceda, R., and Laubach, S. E., 2017, Bed-parallel beef veins and cross-cutting vertical fractures in the Vaca Muerta Formation, Argentina: a fracture opening and cementation history (abs.): ECROFI 2017.

Fall, A., Ukar, E., Lopez, R. G., Gale, J. F. W., Manceda, R., and Laubach, S. E., 2017, Combined effects of overpressure and bed-parallel contraction on the formation of bed-parallel and vertical fractures in the Vaca Muerta Formation, Argentina (abs.): Geological Society of America Abstracts with Programs, v. 49, no. 6, <http://doi.org/doi:10.1130/abs/2017AM-301560>.

Fall, A., Ukar, E., Lopez, R. G., Gale, J. F. W., Manceda, R., and Laubach, S. E., 2017, Timing of opening and cementation of bedding-parallel and vertical fractures, Vaca Muerta Formation, Argentina (abs.): AAPG Annual Meeting, no. 2606490.

Forstner, S., Laubach, S. E., and Fall, A., 2017, Regional brittle deformation, strain, and paleostress trajectories, Teton Range, Wyoming, USA (abs.): Geological Society of America Abstracts with Programs, Seattle Wash., v. 49, no. 6, <http://doi.org/10.1130/abs/2017AM-308570>.

Laubach, S. E., Olson, J. E., Lander, R. H., and Hooker, J. N., 2017, Chemical-mechanical feedback and fracture size and spacing patterns (abs.): 21st International Conference on Deformation Mechanisms, Rheology and Tectonics (DRT), Inverness, Scotland, p. 85.

Ramos, M., Espinoza, D., Laubach, S. E., Spikes, K., and Torres-Verdin, C., 2017, Stress-dependent dynamic-static transforms of anisotropic Mancos Shale (abs.): 51st American Rock Mechanics Association Rock Mechanics/Geomechanics Symposium, San Francisco, Calif., ARMA17-0182, p. 120-121.

Ukar, E., Lopez, R. G., Fall, A., Manceda, R., Gale, J. F. W., and Laubach, S. E., 2017, New type of kinematic indicator in bedding-parallel veins and vertical fracture abundance and timing in Vaca Muerta Formation, Argentina (abs.): AAPG Annual Meeting, no. 2608925.

Ukar, E., Lopez, R. G., Fall, A., Manceda, R., Gale, J. F. W., and Laubach, S. E., 2017, Vertical fractures and a new type of kinematic indicator in bed-parallel veins (beef) at Arroyo Mulichinco, Neuquen Basin (ext. abs.): XX Congreso Geologico Argentino Extended Abstracts, p. 163-165.

Laubach, S. E., 2016, Predicting fracture porosity evolution in sandstone (ext. abs.): Department of Energy public abstract.

Li, J. Z., Gale, J. F. W., Marrett, R. A., and Laubach, S. E., 2016, Quantifying natural fracture spatial organization in horizontal image logs: application in unconventional reservoirs (ext. abs.): Unconventional Resources Technology Conference, no. URTec 2456264, 8 p., <http://doi.org/10.15530-urtec-2016-2456264>.

Ukar, E., Laubach, S. E., and Marrett, R., 2016, How to measure fracture opening rates using quartz c-axis orientations (abs.): EBSD Conference.

English, J., and Laubach, S. E., 2015, Driving mechanisms for regional opening-mode fracture systems - Insights from fluid inclusion microthermometry of crack-seal fracture cements (abs.): The Geology of Geomechanics, Geological Society of London workshop, conference program.

Fall, A., Ukar, E., Marrett, R., and Laubach, S. E., 2015, Dauphiné twin planes in quartz trap fluid inclusions and indicate paleostress in deeply buried sandstones (ext. abs.): 23rd European Current Research on Fluid Inclusions, Leeds, United Kingdom, Abstract volume, p. 61-61.

Laubach, S. E., 2015, The role of structural diagenesis in faulting and fracturing of upper crustal rocks (abs.): European Geophysical Union General Assembly, Geophysical Research Abstracts, v. 17, EGU2015-6417.

Alzayer, Y. A., Fall, A., Laubach, S. E., and Eichhubl, P., 2014, Fracture growth processes in sandstone inferred from textural and fluid inclusion investigations of crack-seal fracture cements

(abs.): American Association of Petroleum Geologists Annual Convention and Exhibition, Houston, Texas.

Copley, L. K., Laubach, S. E., and Marret, R., 2014, Influence of diagenesis on regional and fold-related fracture size distribution (abs.): GSA Annual Meeting.

Eichhubl, P., Alzayer, Y., Laubach, S. E., and Fall, A., 2014, Growth kinematics of opening-mode fractures (abs.): AGU Fall Meeting abstract H51Q-02.

Fall, A., Eichhubl, P., and Laubach, S. E., 2014, Propagation and timing of natural fractures in deep reservoirs (abs.): GSA Annual Meeting.

Lander, R. H., and Laubach, S. E., 2014, A model for quartz cementation in fractured sandstone (abs.): Geological Society of London Reservoir Quality of Clastic and Carbonate Rocks: Analysis, Modelling and Prediction, 29 May 2014, London.

Laubach, S. E., 2014, Rates of fracture array growth and sealing from a model for quartz cementation and implications for fracture size scaling (abs.): Program abstracts volumes, Basic Energy Sciences Principal Investigators meeting, Gaithersburg, MD, May 16.

Ozkan, A., Bonnell, L., Milliken, K., Laubach, S. E., and Cumella, S., 2014, How tight was the Williams Fork tight gas sandstone at the time of gas generation and fracturing, Piceance Basin, Colorado? (abs.): American Association of Petroleum Geologists Annual Convention and Exhibition, Houston, Texas.

Ukar, E., Laubach, S. E., Fall, A., and Eichhubl, P., 2014, Synkinematic quartz cementation in partially open fractures in sandstones (abs.): European Geophysical Union General Assembly, Vienna, Austria, April 27-May 2.

Eichhubl, Peter, Fall, A., and Laubach, S. E., 2013, Natural hydraulic fracturing of tight-gas sandstone reservoirs, Piceance Basin, Colorado (abs.): Geological Society of America Annual Meeting & Exposition, Denver, Colorado, Paper No. 183-9.

Eichhubl, Peter, Fall, A., Prodanovic, M., Tokan-Lawal, A., Lander, R. H., and Laubach, S. E., 2013, Chemical-mechanical interactions during natural fracture growth in tight gas and oil reservoirs: Implications for flow during reservoir charge and production (abs.): European Geosciences Union General Assembly 2013, Vienna, Austria, 07-12 April 2013, Geophysical Research Abstracts, v. 15, EGU2013-13297.

Fall, A., Eichhubl, Peter, and Laubach, S. E., 2013, A history of natural fracture propagation in deep gas reservoirs using fluid inclusions (abs.): 22nd European Current Research on Fluid Inclusions, Antalya, Turkey, 4-9 June, in: Haniçlı, Bozkaya, G., eds., Abstract book, p. 45-46.

Fall, A., Eichhubl, Peter, Black, K., and Laubach, S. E., 2013, A 48 m.y. history of fracture propagation (abs.): AAPG Annual Convention and Exhibition, Pittsburgh, Pennsylvania, Abstract vol., abs. 1556361.

Fall, A., Eichhubl, Peter, Black, K., and Laubach, S. E., 2013, A 48 M.Y. history of natural fracture propagation (abs.): in American Association of Petroleum Geologists Annual Convention and Exhibition, Pittsburgh, Pennsylvania, May 19-22, abstracts, CD-ROM.

Fall, A., Eichhubl, Peter, Black, K., and Laubach, S. E., 2013, A chronicle of natural fracture propagation using fluid inclusions, 47th South-Central Section Annual GSA Meeting, Austin, Texas, 4-5 April, Geological Society of America Abstracts with Programs, v. 45, no. 3, p. 74.

Hooker, J. N., and Laubach, S. E., 2013, Natural fracturing, by depth (abs.): EGU General Assembly 2013, EGU General Assembly Conference Abstracts, Vienna, Austria, 7-12 April, v. 15, p. 13725.

Laubach, S. E., 2013, Fault damage zone and core fracture porosity and strength differs in adjacent sandstones owing to inhibited quartz accumulation on feldspar and lithic grain substrates (abs.): in GSA Annual Meeting & Exposition, Denver, Colorado, Paper No. 183-11.

Eichhubl, Peter, Fall, Andras, Prodanovic, M., Weisenberger, T., Ukar, E., Laubach, S. E., and Gale, Julia F. W., 2012, Chemical-mechanical interactions during fracture growth in tight-gas and oil reservoirs: implications for flow during reservoir charge and production (abs.), in Fall Meeting, AGU, San Francisco, California, December 3-7, Abstract 1502338.

Eichhubl, Peter, Gale, Julia F. W., Olson, J., Laubach, S. E., Hooker, John N., Fall, Andras, Weisenberger, T., and Ukar, E., 2012, What can outcrop and core based observations tell us about natural fractures in unconventional reservoirs? (abs.): American Association of Petroleum Geologists, Annual Convention, Abstract 1236894, 1 p.

Ellis, M., Laubach, S. E., Eichhubl, P., Olson, J. E., and Hargrove, P., 2012, Fracture development and diagenesis of the Torridon Group Applecross Formation, near An Teallach, NW Scotland: millenia of brittle deformation resilience? (abs.): Geological Society of America Abstracts with Programs, v. 44, no. 7, p. 488.

Ellis, M., Laubach, S. E., Eichhubl, P., Olson, J. E., and Hargrove, P., 2012, Fracture development and diagenesis of the Torridon Group Applecross Formation, near An Teallach, NW Scotland: millenia of brittle deformation resilience? (abs.), in GSA Annual Meeting & Exposition, November 6, Charlotte, North Carolina, Paper No. 205-6.

Fall, A., Eichhubl, P., and Laubach, S. E., 2012, Testing the basin-centered gas accumulation model using fluid inclusion observations: Piceance Basin, Colorado (abs.), in GSA Annual Meeting & Exposition, November 7, Charlotte, North Carolina, Paper No. 253-7.

Fall, A., Eichhubl, P., Laubach, S. E., and Bodnar, R. J., 2012, Testing the basin-centered gas accumulation model using fluid inclusion observations: Piceance Basin, Colorado (abs.): Geological Society of America Abstracts with Programs, v. 44, no. 7, p. 594.

Fall, A., Gale, J. F. W., Eichhubl, P., Ali, W. A., Bodnar, R. J., and Laubach, S. E., 2012, Opening-mode fracturing and cementation during hydrocarbon generation in mudrocks: an example from the Barnett Shale, West Texas (abs.), in Goldschmidt Conference, Montréal, Québec, Canada, June 24-29, Abstract 23A1-15.

Fall, A., Weisenberger, T. B., Eichhubl, P., Laubach, S. E., Davis, J. S., and Bodnar, R. J., 2012, Diagenetic controls on carbonate fracture cementation in tight-gas sandstones (abs.), in 11th Pan-American Current Research on Fluid Inclusions, Windsor, Ontario, Canada, p. 31-32.

Fall, Andras, Eichhubl, Peter, Laubach, S. E., and Bodnar, R. J., 2012, Timing and duration of gas charge-driven fracturing in tight-gas sandstone reservoirs based on fluid inclusion observations: Piceance Basin, Colorado (abs.), in Fall Meeting, AGU, San Francisco, California, December 3-7, Abstract 1496247.

Fall, Andras, Gale, Julia F. W., Eichhubl, Peter, Ali, Walaa, Laubach, S. E., and Bodnar, R. J., 2012, Opening-mode fracturing and cementation during hydrocarbon generation in mudrocks: an example from the Barnett Shale, West Texas (abs.), in Goldschmidt Conference, Montréal, Québec, Canada, June 24-29, Abstract 23A1-15.

Fall, Andras, Weisenberger, T., Eichhubl, Peter, Laubach, S. E., Davis, J. S., and Bodnar, R. J., 2012, Diagenetic controls on carbonate fracture cementation in tight-gas sandstones (abs.), in 11th Pan-American Current Research on Fluid Inclusions, Windsor, Ontario, Canada, p. 31-32.

Gale, J. F. W., Holder, J., Olson, J. E., Laubach, S. E., and Fidler, L. J., 2012, Natural fracture growth in shales: mechanisms and implications for assessment of shale resource plays (abs.), in AAPG Geoscience Technology Workshop on International Shales Unconventional Gas, Houston, October 11-12, 1 p.

Gale, Julia F. W., Pommer, L., Ouyang, X., Fall, Andras, Eichhubl, Peter, Olson, J., and Laubach, S. E., 2012, Natural fracture characterization in shale-gas reservoirs: spatial organization and fracture sealing (abs.): American Association of Petroleum Geologists, Annual Convention, Abstract 1236686, 1 p.

Hooker, J. N., and Laubach, S. E., 2012, The role of structure and diagenesis in governing fluid storage and flow in deep sedimentary basins with applications to unconventional oil and gas reservoirs (abs.), in GSA Annual Meeting & Exposition, November 7, Charlotte, North Carolina, Paper No. 253-4.

Hooker, J. N., Hooker, John N., Laubach, S. E., and Laubach, S. E., 2012, Diagenetic controls on fracture size distributions (abs.): Geological Society of America Abstracts with Programs, v. 44, no. 7, p. 594.

Hooker, John N., Eichhubl, Peter, and Laubach, S. E., 2012, Reconstructing the growth of a fracture set using fluid inclusion microthermometry, El Alamar Formation (Triassic), NE Mexico (abs.): in AGU Fall Meeting, Abstract T21A-2556.

Ozkan, A., Laubach, S. E., Milliken, K., and Bonnell, L., 2012, Constraining uplift in the Piceance Basin using diagenetic modeling of quartz cementation in Late Cretaceous Williams Fork Sandstones, Colorado (abs.): American Association of Petroleum Geologists, Annual Convention, Abstract 1240512, 1 p.

Pommer, L. E., Eichhubl, P., Fall, A., and Laubach, S. E., 2012, Using structural diagenesis to infer the timing of natural fractures in the Marcellus Shale (abs.): Geological Society of America Abstracts with Programs, v. 44, no. 7, p. 488.

Pommer, L., Gale, J. F. W., Eichhubl, P., Fall, A., and Laubach, S. E., 2012, Using structural diagenesis to infer the timing of natural fractures in the Marcellus Shale (abs.), in GSA Annual Meeting & Exposition, November 6, Charlotte, North Carolina, Paper No. 205-5.

Ukar, E., Eichhubl, P., Fall, A., Hooker, J. N., and Laubach, S. E., 2012, Structural-diagenetic controls on fracture opening in tight-gas sandstone reservoirs, Alberta Foothills (abs.): Fall Meeting, AGU, San Francisco, California, December 3-7, no. 1476703.

Weisenberger, T., Eichhubl, P., Fall, A., and Laubach, S. E., 2012, Fracture degradation by carbonate cement in tight-gas sandstones, Piceance Basin, Colorado (abs.), in Proceedings of the 34th International Geological Congress, August 5-10, Brisbane, Australia, Abstract 2681.

Weisenberger, T., Fall, A., Hooker, J. N., Eichhubl, P., Laubach, S. E., and Davis, J. S., 2012, Predicting fracture porosity degradation by calcite cement in Mesaverde Group sandstones, Piceance Basin, Canada (abs.): American Association of Petroleum Geologists, Annual Convention, Abstract 1232574, 1 p.

Fall, A., Eichhubl, P., Bodnar, R. J., and Laubach, S. E., 2011, Assessment of pore fluid pressure history in basin-centered gas accumulations using fluid inclusions (abs.), in Goldschmidt Conference Abstracts, Prague, p. 826.

Fall, A., Eichhubl, P., Laubach, S. E., and Bodnar, R. J., 2011, Coupled pore fluid pressure oscillation and natural fracture opening in tight-gas sandstone reservoirs: Piceance Basin, Colorado, USA (ext. abs.), in European Current Research on Fluid Inclusions (ECROFI-XXI), Montanuniversität Leoben, Austria, August 9-11, p. 86.

Fall, Andras, Eichhubl, Peter, Bodnar, R. J., and Laubach, S. E., 2011, Testing the basin-centered gas model using fluid inclusion observations (abs.): American Association of Petroleum Geologists Annual Convention & Exhibition Abstracts Volume, v. 20, p. 56-57.

Fidler, L. J., Gale, Julia F. W., Holder, Jon, and Laubach, S. E., 2011, The importance of subcritical index for determining fracture spacing in the New Albany Shale, Illinois Basin (abs.): American Association of Petroleum Geologists Annual Convention & Exhibition Abstracts Volume, v. 20, p. 58.

Gale, J. F. W., Holder, J., Olson, J. E., Laubach, S. E., and Fidler, L. J., 2011, Natural fracture growth in shales: mechanisms and implications for assessment of shale resource plays (abs.), in Global Unconventional Gas Meeting, Beijing, China, September 13-15, 1 p.

Gale, J. F. W., Pommer, L., Ouyang, X., and Laubach, S. E., 2011, Natural fracture

characterization in shale-gas reservoirs: spatial organization and fracture sealing (abs.), in American Association of Petroleum Geologists Eastern Section Meeting, September 26-27, 1 p.

Gale, Julia F. W., Eichhubl, Peter, Fall, Andras, and Laubach, S. E., 2011, Natural fractures in shales: timing, sealing, mechanisms of formation, and relevance for shale-gas reservoirs (abs.): American Association of Petroleum Geologists Annual Convention & Exhibition Abstracts Volume, v. 20, p. 64-65.

Hooker, J. N., Eichhubl, P., Xu, G., Ahn, H., Fall, A., Hargrove, P., Laubach, S. E., and Ukar, E., 2011, Effects of fracture reactivation and diagenesis on fracture network evolution: Cambrian Eriboll Formation, NW Scotland (abs.): EOS, v. 92, no. 52, fall meeting supplement, Abstract No. H21B-1097.

Hooker, J. N., Laubach, S. E., Gale, J. F. W., and Gomez, L. A., 2011, Crack-seal deformation and the development of power-law size distributions of fractures in sedimentary rocks (abs.), in AAPG International Conference and Exhibition, Milan, Italy, 23-26 October, AAPG Search and Discovery Article #90135.

Hooker, John N., Fall, Andras, Kaylor, A., Xu, G., Anh, H., Eichhubl, Peter, and Laubach, S. E., 2011, Predicting open natural fractures in unconventional sandstone reservoirs: spatial distribution, diagenesis, timing, and opening rates (abs.): American Association of Petroleum Geologists Annual Convention & Exhibition Abstracts Volume, v. 20, p. 85-86.

Laubach, S. E., 2011, Structural diagenesis, resource plays, the Highlands of Scotland, and curriculum development (abs.): Abstract from 2011-2012 AAPG Foundation Distinguished Lecture presentation, [http://www.aapg.org/education/dist\\_lect/laubach\\_abs.cfm](http://www.aapg.org/education/dist_lect/laubach_abs.cfm): AAPG Search and Discovery Article #90136©2011.

Ozkan, A., Milliken, K., Laubach, S. E., Holder, Jon, and Olson, J., 2011, Quantification of effects of cementation on subcritical crack index by comparison of outcrop and subsurface samples of Williams Fork Formation, Piceance Basin (abs.): American Association of Petroleum Geologists Annual Convention & Exhibition Abstracts Volume, v. 20, p. 136.

Eichhubl, P., Fall, A., Hooker, J. N., Davis, J. S., Becker, S. P., Laubach, S. E., and Bodnar, R. J., 2010, Timing and stratigraphic distribution of natural fractures in tight gas reservoirs in the Piceance Creek field, Colorado, USA, based on fluid inclusion and fracture scaling analyses (abs.), in AAPG International Conference: The geology of unconventional gas plays: The Geological Society, London, October 5-6, p. 51.

Eichhubl, Peter, Hooker, John N., Fall, Andras, and Laubach, S. E., 2010, Strain rates of opening-mode fractures in deep basinal settings (abs.): European Geosciences Union-Geophysical Research Abstracts, v. 12, EGU2010-5645.

Fall, A., Eichhubl, P., Bodnar, R. J., and Laubach, S. E., 2010, Crack-seal cementation of natural fractures recording pore fluid evolution in tight gas sandstone reservoirs (abs.), in IMA2010, 20th General Meeting of the International Mineralogical Association, August 21-27, Budapest, Hungary, p. 193.

Fall, Andras, Eichhubl, Peter, Bodnar, R. J., and Laubach, S. E., 2010, Crack-seal cementation of natural fractures recording pore fluid evolution in tight gas sandstone reservoirs (abs.): Acta Mineralogica-Petrographica Abstract Series, v. 6, p. 193.

Fall, Andras, Eichhubl, Peter, Bodnar, R. J., Becker, S. P., and Laubach, S. E., 2010, Pore fluid evolution in tight-gas sandstone reservoirs based on crack-seal cementation of natural fractures (ext. abs.), in Pan-American Current Research on Fluid Inclusions (PACROFI-X) Conference, University of Nevada Las Vegas, June 8-10, Abstract Volume, p. 41-42.

Gale, J. F. W., Eichhubl, P., Fall, A., and Laubach, S. E., 2010, Natural fractures in shales: timing, sealing, mechanisms of formation, and relevance for shale-gas reservoirs (abs.), in AAPG International Conference: The geology of unconventional gas plays: The Geological Society, London, October 5-6, p. 30.

Gale, J. F. W., Holder, J., Olson, J. E., Laubach, S. E., and Fidler, L. J., 2010, Natural fracture growth in shales: mechanisms and implications for assessment of shale resource plays (abs.), in AAPG/SEG/SPE/SPWLA Hedberg Conference, Critical assessment of shale resource plays, December 5-10, Austin, Texas.

Gale, J. F. W., Laubach, S. E., and Fidler, L. J., 2010, Natural fractures in the New Albany Shale, Illinois Basin, and their importance for shale-gas production (abs.): American Association of Petroleum Geologists Annual Convention & Exhibition, v. 19, p. 84.

Gale, Julia F. W., Laubach, S. E., Eichhubl, Peter, and Fall, Andras, 2010, Natural fractures in shales: timing, mechanisms of formation, and relevance for shale-gas reservoirs (abs), in New Zealand Geological Society Annual Meeting, Oamaru, New Zealand: New Zealand Geological Society Miscellaneous Publication 128A & B, ISBN 978-1-877480-07-2 and 978-1-877480-08-9, CD-ROM.

Hooker, J. N., Gale, J. F. W., Gomez, L. A., Laubach, S. E., and Reed, R. M., 2010, The relationship between fracture cement patterns and fracture-set size distributions in carbonate rocks (ext. abs.), in Advances in Carbonate Exploration and Reservoir Analysis, The Geological Society of London Conference, November 4-5, p. 87-89.

Kaylor, A., Eichhubl, P., Laubach, S. E., Fall, A., and Hooker, J. N., 2010, A fluid inclusion and cathodoluminescence approach to model fracture growth in the Triassic-Jurassic La Boca Formation, Northeastern Mexico (abs.): Geological Society of America Abstracts with Program, v. 42, no. 5, p. 472.

Kaylor, A., Laubach, S. E., Eichhubl, Peter, and Fall, Andras, 2010, Timing and rate of fracture opening in sandstone: implications for basin centered gas deposits (abs.), in Stress, strain, and natural fractures, GeoCanada 2010, Working with the Earth, Calgary, Alberta, May 10-14.

Kaylor, A., Laubach, S. E., Fall, A., and Hooker, J. N., 2010, A fluid inclusion and cathodoluminescence approach to model fracture growth in the Triassic-Jurassic La Boca Formation, northeastern Mexico (abs.), in GSA Denver Annual Meeting, October 31-November 3, Paper No. 194-2.

Laubach, S. E., Ellis, M., Hargrove, P., Eichhubl, P., Fall, A., and Fomel, S. B., 2010, Contrasts in fracture array intensity, connectivity, and porosity associated with faults in tight fluvial and marine sandstones: evidence from outcrop analogs and core (abs.), in AAPG International Conference: The geology of unconventional gas plays: The Geological Society, London, October 5-6, p. 53-54.

Laubach, S. E., Ellis, Magdalena, Hargrove, Peter, Eichhubl, Peter, and Fall, Andras, 2010, Contrasts in fracture array intensity, connectivity, and porosity associated with faults in tight fluvial and marine sandstones (abs.): American Association of Petroleum Geologists Annual Convention & Exhibition, v. 19, p. 143.

Laubach, S. E., Hargrove, P., Ellis, M., and Eichhubl, P., 2010, Fracturing, cementation and feedback in a small-offset oblique slip fault in sandstone (abs.): *Geochimica et Cosmochimica Acta*, v. 74, no. 11, Supplement 1, p. A565.

Xu, G., Fall, A., Eichhubl, P., and Laubach, S. E., 2010, Combined fluid inclusion-SEM-cathodoluminescence analysis of microfracture opening in a tight-gas sandstone outcrop analog: Eriboll Formation, NW Scotland (abs.): Geological Society of America Abstracts with Program, v. 42, no. 5, p. 472.

Xu, G., Fall, A., Eichhubl, P., and Laubach, S. E., 2010, Combined fluid inclusion--SEM cathodoluminescence analysis of microfracture opening in a tight-gas sandstone outcrop analog: Eriboll Formation, NW Scotland (abs.), in GSA Denver Annual Meeting, October 31-November 3, Paper No. 194-3.

Becker, S. P., Hooker, John N., Eichhubl, Peter, Laubach, S. E., Lander, R. H., Bonnell, L., Reed, R. M., and Fall, Andras, 2009, History of fracture development and diagenesis in

Piceance Basin tight gas reservoirs: insights from fluid inclusion and fracture scaling analyses (abs.): American Association of Petroleum Geologists Annual Convention, v. 18, p. 18.

Eichhubl, Peter, Laubach, S. E., Hooker, John N., and Fall, Andras, 2009, 10-19 s-1 (abs.): Eos Transactions AGU, v. 90, no. 52, Fall Meeting Supplement, Abstract T41E-02.

Ellis, Magdalena, Hargrove, Peter, and Laubach, S. E., 2009, Fracture pattern development in the Applecross Formation (Torridonian) sandstones south of Ullapool, NW Scotland (abs.), in TSG 2009: Tectonic Studies Group Annual Meeting Programme Abstract Volume, Staffordshire, UK, January 5-8, p. 31.

Fall, Andras, Eichhubl, Peter, Becker, S. P., Bodnar, R. J., and Laubach, S. E., 2009, Tracking fluid evolution using fluid inclusions in synkinematic fracture cements: Piceance Basin, Colorado (abs.), in Portland GSA Annual Meeting, October, Paper No. 93-4, [http://gsa.confex.com/gsa/2009AM/finalprogram/abstract\\_164591.htm](http://gsa.confex.com/gsa/2009AM/finalprogram/abstract_164591.htm)

Hargrove, Peter, Ellis, Magdalena, and Laubach, S. E., 2009, Fault-related fracture pattern evolution and distribution in Cambrian Eriboll Formation sandstones: Northwest Highlands, Scotland (abs.), in TSG 2009: Tectonic Studies Group Annual Meeting Programme Abstract Volume, Staffordshire, UK, January 5-8, p. 32.

Laubach, S. E., Olson, J. E., and Eichhubl, Peter, 2009, Fracture diagenesis and producibility in tight gas sandstones (abs.), in Unconventional energy resources: making the unconventional conventional: 29th Annual GCSSEPM Foundation Bob F. Perkins Research Conference, December 6-8, Houston, p. 26.

Ozkan, A., Cumella, S. P., Milliken, K., and Laubach, S. E., 2009, Prediction of diagenesis and reservoir quality using well logs, Williams Fork Formation, Mamm Creek field, Piceance Basin (abs.): American Association of Petroleum Geologists Annual Convention, v. 18, p. 159.

Becker, S. P., Eichhubl, P., Laubach, S. E., and Bodnar, R. J., 2008, Fluid inclusion evidence of overpressure throughout a ~42 m.y. history of fracture opening in the Travis Peak Formation, East Texas Basin (abs.), in GSA, ASA-CSSA-SSSA, GCAGS Joint Annual Meeting, Abstracts with Programs, 290-2.

Becker, S. P., Eichhubl, P., Laubach, S. E., and Bodnar, R. J., 2008, Fluid inclusion evidence of overpressure throughout a ~42 m.y. history of fracture opening in the Travis Peak Formation, East Texas Basin (abs.): Geological Society of America Abstracts with Programs, v. 40.

Becker, S. P., Eichhubl, P., Laubach, S. E., Reed, R. M., and Lander, R. H., 2008, Fluid inclusion evidence for an extended opening history of fractures in quartz cemented sandstone reservoirs (abs.), in Belkin, H. E. ed., Ninth Pan-American Conference on Research on Fluid Inclusions Programs and Abstracts, p. 5.

Becker, S. P., Eichhubl, Peter, Laubach, S. E., Reed, R. M., and Lander, R. H., 2008, Fluid inclusion evidence for an extended opening history of fractures in quartz cemented sandstone reservoirs, in Belkin, H. E., ed., PACROFIIX: Ninth Pan-American Conference on Research on Fluid Inclusions, Reston, Virginia, June 2-5, p. 5.

Becker, S. P., Laubach, S. E., Eichhubl, Peter, Reed, R. M., and Lander, R. H., 2008, Fluid inclusion constraints from the opening history of fractures in tight gas sandstone reservoirs (abs.): AAPG 2008 Annual Convention and Exhibition Abstracts Volume, v. 17, p. 15.

Diaz Tushman, Kira, and Laubach, S. E., 2008, Fracture pattern evolution during diagenesis: fracture history of Cambrian Eriboll Group, northwestern Scotland (abs.): AAPG 2008 Annual Convention and Exhibition Abstracts Volume, v. 17, p. 43-44.

Laubach, S. E., 2008, Structural diagenesis (abs.), in International Geological Congress, Oslo, Norway, August 6-14th.

Laubach, S. E., 2008, Structural diagenesis: an integrated investigative approach to coupled chemical and mechanical process in sedimentary systems (abs.): Geological Society of



America Abstracts with Programs, v. 40.

Laubach, S. E., 2008, Structural diagenesis: An integrated investigative approach to coupled chemical and mechanical processes in sedimentary systems (abs.): Geological Society of America Annual Convention, no. 290-1.

Laubach, S. E., Milliken, K. L., Eichhubl, Peter, Lander, R., Bonnell, L., Olson, J., and Thomas, Andrew, 2008, Structural diagenesis: the integration of structural geology and diagenesis (abs.): AAPG 2008 Annual Convention and Exhibition Abstracts Volume, v. 17, p. 116.

Pinzon, E. A., and Laubach, S. E., 2008, Fracture pattern prediction using geomechanical models incorporating diagenesis, with comparison to outcrop data (Cambrian Eriboll Group sandstones, Northwestern Scotland) (abs.): Geological Society of America Abstracts with Programs, v. 40.

Playton, Meghan, Laubach, S. E., and Lander, R. H., 2008, Mapped quartz cement growth history in opening-mode fractures from the La Boca Formation, northeast Mexico (abs.): AAPG 2008 Annual Convention and Exhibition Abstracts Volume, v. 17, p. 161.

Diaz Tushman, Kira, Laubach, S. E., Marrett, R., Eichhubl, P., and Wawrzyniec, Tim, 2007, Diagenetic controls on fracture size scaling and fracture porosity evolution, Cambrian Eriboll Group Sandstone, NW Scotland: implications for distributed brittle deformation and fluid flow in the continental lithosphere (abs.), in Programme with abstracts: Continental Tectonics and Mountain Building Ullapool 12-19 May: Geological Society of London, The Peach and Horne Meeting, unpaginated.

Hooker, J. N., Gale, J. F. W., Laubach, S. E., Gomez, L. A., Marrett, R. A., and Reed, R. M., 2007, Power-law scaling of fracture aperture sizes in otherwise undeformed foreland basin sandstone: an example from the Cozzette Sandstone, Piceance Basin, Colorado (abs.): EOS, v. 88, no. 52, Fall Meeting Supplement, Abstract T42C-01.

Laubach, S. E., and Ward, M. E., 2007, Structural complexity in structurally simple fractured reservoir analogs (abs.): American Association of Petroleum Geologists Annual Convention Abstracts Volume, v. 16, p. 80.

Laubach, S. E., Diaz Tushman, Kira, Pinzon, Edgar, and Marrett, Randy, 2007, Fracture processes and fracture history, Cambrian Eriboll Sandstone (abs.), in Programme with abstracts: Continental Tectonics and Mountain Building Ullapool 12-19 May: Geological Society of London, The Peach and Horne Meeting, unpaginated.

Diaz Tushman, Kira, Laubach, S. E., and Marrett, R. A., 2006, Fracture pattern heterogeneity in Km-scale reservoir-analog outcrops (abs.): American Association of Petroleum Geologists Annual Convention, v. 15, p. 26.

Eichhubl, P., Aydin, A., Lander, R. H., Laubach, S. E., Reed, R. M., Boles, J. R., and Du Bernard, X., 2006, Deformation band formation as coupled mechanical and chemical processes (abs.): EOS, v. 87, no. 52, Fall Meeting Supplement, Abstract T43A-1634.

Hooker, J. N., Laubach, S. E., Gale, Julia F. W., and Reed, R. M., 2006, Microfractures in sandstone (abs.): American Association of Petroleum Geologists Annual Convention, v. 15, p. 49.

Laubach, S. E., and Olson, J. E., 2006, Verifiable predictions of fractured reservoir attributes (abs.), in American Association of Petroleum Geologists International Conference and Exhibition, Perth, Australia, November 5-8, Technical Program, 1 p.

Laubach, S. E., Diaz Tushman, K., Ward, M. E., Olson, J., Marrett, R. A., and Lander, R., 2006, Using diagenesis to unravel fracture history and select suitable outcrop analogs for buried fracture systems (abs.): Geological Society of America Abstracts with Programs, v. 38, no. 7, p. 129.

Laubach, S. E., Lander, R., Wilson, C. R., Ozkan, A., Olson, J. E., Bonnell, L. M., Gale, J. F. W.,

and Eichhubl, P., 2006, Fracture opening, burial diagenesis, and fracture sealing as linked processes controlling permeability in Upper Cretaceous Mesaverde Group sandstones, Piceance Basin, Colorado (abs.): Geological Society of America Abstracts with Programs, v. 38, no. 7, p. 26.

Laubach, S. E., Olson, J., Eichhubl, P., and Lander, R., 2006, Accurate and verifiable interwellbore fracture attribute predictions (abs.), in 68th EAGE Conference and Exhibition extended abstracts and exhibitors' catalogue, Abstract E041.

Laubach, S. E., Ward, M. E., and Gomez, L. A., 2006, Vertical and lateral scales of heterogeneity in a fractured reservoir analog, Middle Triassic to Lower Jurassic La Boca Formation, NE Mexico (abs.), in Jolley, Steve, Knipe, Rob, Barr, Dave, Walsh, John, and Anderson, Duncan, technical convenors, Proceedings, Structurally Complex Reservoirs, February 28-March 2, Burlington House, London: The Geological Society, p. 24.

Laubach, S. E., Ward, M. E., and Gomez, L. A., 2006, Vertical and lateral scales of heterogeneity in a fractured reservoir analog, Middle Triassic to Lower Jurassic La Boca Formation, northeast Mexico (abs.): American Association of Petroleum Geologists Annual Convention, v. 15, p. 61.

Pinzon, E. A., Ortiz, A., and Laubach, S. E., 2006, New techniques on fracture pattern characterization: An example of comparison between Jurassic Nugget Sandstones (Utah Rocky Mountains) and Eocene Mirador Formation Sandstones (Colombia Llanos Foothills Basin) (ext. abs.), in Asociación Colombiana de Geólogos y Geofísicos del Petróleo (ACGGP), 4 p.

Reed, R. M., and Laubach, S. E., 2006, Preliminary fracture analysis of Mississippian Barnett Shale samples, Fort Worth Basin, Texas (abs.): Geological Society of America, South-Central Section, Abstracts with Programs, v. 38, no. 1, p. 8.

Ward, Meghan, Laubach, S. E., and Marrett, Randall, 2006, Testing the use of microfractures to predict fracture orientation and intensity, La Boca Formation, northeast Mexico (abs.): American Association of Petroleum Geologists Annual Convention, v. 15, p. 112.

Diaz Tushman, Kira, and Laubach, S. E., 2005, Regional subthrust fracture arrays in outcrop: guide to attributes of tight gas sandstones (abs.), in Rocky Mountain Section--AAPG Annual Meeting technical program, September 24-26.

Diaz Tushman, Kira, Laubach, S. E., and Gomez, L. A., 2005, Expanding the tectonic history of the Highlands: a strain study utilizing fractures from Cambrian Eriboll Group sandstones (abs.): Geological Society of America Abstracts with Programs, v. 37, no. 7, p. 235-236.

Gale, Julia F. W., Laubach, S. E., Olson, J. E., and Marrett, R., 2005, Using the link between diagenesis and fracturing to accurately predict, characterize, and model fluid flow in fractured carbonate rocks (abs.), in Proceedings, IX Latin American and the Caribbean Petroleum Engineering Conference, Rio de Janeiro, June 20-23, p. 28-29.

Laubach, S. E., and Diaz Tushman, Kira, 2005, Fracture arrays in a subthrust setting: Cambrian Eriboll Group Sandstones, NW Scotland (abs.): Geological Society of America Abstracts with Programs, v. 37, no. 3, p. 11.

Laubach, S. E., and Tushman, K. D., 2005, Fracture arrays in a subthrust setting: Cambrian Eriboll Group sandstones, NW Scotland (abs.): Geological Society of America Abstracts with Programs, v. 37, no. 7, p. 11.

Laubach, S. E., Gale, J. F. W., Marrett, R., and Olson, J. E., 2005, Linked diagenesis and fracture patterns and their effect on fluid flow in fractured carbonate rocks (abs.), in AAPG Paris International Meeting.

Laubach, S. E., Olson, J. E., Lander, R., and Milliken, K., 2005, Structural diagenesis--linked chemical and mechanical processes in sedimentary basins (abs.), in AAPG Paris International Meeting

Pinzon, E. A., Laubach, S. E., and Gale, J. F. W., 2005, Competition between fracture growth and cement precipitation in Nugget sandstone: influence on volume and distribution of fracture porosity (abs.): Geological Society of America Abstracts with Programs, v. 37, no. 7, p. 209.

Reed, R. M., and Laubach, S. E., 2005, Integrated SEM-based cathodoluminescence imaging and fluid inclusion analysis of crack-seal quartz cement in sandstone macrofractures (abs.): Geological Society of America Abstracts with Programs, v. 37, no. 7, p. 235.

Ward, M. E., and Laubach, S. E., 2005, Fractured sandstone outcrops in northeast Mexico: guides to the attributes of fractures in tight gas sandstones (abs.), in Meeting program, 2005 Rocky Mountain Section - AAPG Jackson Hole Meeting, p. 53.

Ward, M. E., and Laubach, S. E., 2005, Fractured sandstone outcrops in northeast Mexico: guides to the attributes of fractures in tight gas sandstones (abs.), in Rocky Mountain Section--AAPG Annual Meeting technical program, September 24-26.

Ward, M. E., and Laubach, S. E., 2005, Opening history and porosity evolution of fractures in sandstone beneath an evaporite detachment, Gulf of Mexico Basin (abs.), in Budding new technologies: Southwest Section American Association of Petroleum Geologists Convention, April 10-13, Fredericksburg, Texas, unpaginated.

Bonnell, L. M., Lander, R. H., Laubach, S. E., and Gale, J. F. W., 2004, Sealed, bridged or open--a new theory for quartz cementation in fractures (abs.): American Association of Petroleum Geologists, 2003-2004 Distinguished Lecture Abstract, [http://www.aapg.org/education/dist\\_lect/download/bonnell.pdf](http://www.aapg.org/education/dist_lect/download/bonnell.pdf).

Gale, J. F. W., Gomez, L., Marrett, R. A., Olson, J. E., Laubach, S. E., Holder, J., Rijken, P., and Cumella, S., 2004, Natural fracture and diagenetic controls on producibility of low permeability, Upper Cretaceous Williams Fork Formation and Cozzette sandstones, Piceance Basin, Colorado (abs.): American Association of Petroleum Geologists Annual Convention Abstracts Volume, v. 13, p. A49.

Lander, R. H., Bonnell, L. M., Laubach, S. E., and Olson, J. E., 2004, Theory for quartz cementation in structurally deformed sandstones (abs.), in Flow and transport: characterization and modeling from pore to reservoir scales: 11th Annual Geosciences Research Program Symposium, Gaithersburg, Maryland, September 24-25, p. 29-30.

Lander, R. H., Bonnell, L. M., Laubach, S. E., Larese, R. E., and Gale, J. F. W., 2004, Theory for quartz cementation in structurally deformed sandstones (abs.), in AAPG Hedberg Conference, Structural diagenesis: fundamental advances and new applications from a holistic view of mechanical and chemical processes, February 8-11, unpaginated [2 p.].

Lander, R., Bonnell, L., Laubach, S. E., Larese, R. E., and Gale, J., 2004, Theory for quartz cementation in structurally deformed sandstones (ext. abs.), in Lander, Rob, Olson, Jon, Welton, Joann, and Woodward, Nick, conveners, Structural diagenesis: fundamental advances and new applications from a holistic view of mechanical and chemical processes: AAPG Hedberg Research Conference, Austin, Texas: American Association of Petroleum Geologists, unpaginated.

Laubach, S. E., 2004, Controls on reservoir behavior in deep sedimentary basins: the Hedberg Conference on Structural Diagenesis: Outcrop (abs.): Newsletter of the Rocky Mountain Association Geologists, v. 53, no. 4, p. 8.

Laubach, S. E., and Milliken, K. L., 2004, Opening keynote address: Opportunities for interdisciplinary studies in sedimentary basins: an introduction to the Hedberg Conference on Structural Diagenesis (abs.), in Lander, Rob, Olson, Jon, Welton, Joann, and Woodward, Nick, conveners, Structural diagenesis: fundamental advances and new applications from a holistic view of mechanical and chemical processes: AAPG Hedberg Research Conference, Austin, Texas: American Association of Petroleum Geologists, unpaginated.

Laubach, S. E., and Milliken, K. L., 2004, Opportunities for interdisciplinary studies in

sedimentary basins: an introduction to the Hedberg Conference on Structural Diagenesis (abs.), in AAPG Hedberg Conference, Structural diagenesis: fundamental advances and new applications from a holistic view of mechanical and chemical processes, February 8-11, unpaginated [1 p.].

Gale, J. F. W., Gomez, L. A., Marrett, Randall, Olson, J., Laubach, S. E., Holder, Jon, Rijken, Peggy, and Cumella, S. P., 2003, Natural fracture and diagenetic controls on producibility of low permeability, Upper Cretaceous Williams Fork Formation and Cozzette Sandstones, Piceance Basin, Colorado (abs.), in Technical Session: Piceance Basin Field Symposium, Glenwood Springs, CO: Rocky Mountain Association of Geologists and American Institute of Professional Geologists, p. 28.

Gale, J. F. W., Gomez, Leonel, Laubach, S. E., Marrett, Randall, Olson, J. E., Holder, Jon, and Reed, R. M., 2003, Predicting and characterizing fractures in the Ellenburger: using the link between diagenesis and fracturing (abs.), in New methods for locating and recovering remaining hydrocarbons in the Permian Basin: The University of Texas at Austin, Bureau of Economic Geology; Petroleum Technology Transfer Council; and University Lands West Texas Operations, p. 8.

Gomez, Leonel, Gale, J. F. W., Reed, R. M., Loucks, R. G., Ruppel, S. C., and Laubach, S. E., 2003, New techniques in fracture imaging and quantification: applications in the Ellenburger Group, West Texas (abs.), in Hunt, T. J., and Lufholm, P. H., The Permian Basin: back to basics: West Texas Geological Society Fall Symposium: West Texas Geological Society Publication #03-112, p. 419-420.

Gomez, Leonel, Gale, J. F. W., Reed, R. M., Loucks, R. G., Ruppel, S. C., and Laubach, S. E., 2003, New techniques in fracture imaging and quantification: applications in the Ellenburger Group, West Texas (abs.), in New methods for locating and recovering remaining hydrocarbons in the Permian Basin: The University of Texas at Austin, Bureau of Economic Geology; Petroleum Technology Transfer Council; and University Lands West Texas Operations, p. 9.

Gomez, Leonel, Gale, J. F. W., Reed, R. M., Loucks, R. G., Ruppel, S. C., and Laubach, S. E., 2003, New techniques in fracture imaging and quantification: applications in the Ellenburger Group, West Texas (abs.): American Association of Petroleum Geologists Annual Convention Official Program, v. 12, p. A64.

Laubach, S. E., 2003, Progressive diagenesis, evolving mechanical stratigraphy, and fracture patterns in tight gas sandstone (abs.): American Association of Petroleum Geologists Annual Convention Official Program, v. 12, p. A99.

Laubach, S. E., Olson, J. E., Lander, R. H., and Bonnell, L. M., 2003, Interaction between diagenetic reactions and mechanics of opening-mode fractures in sandstones: implications for fracture characterization and fracture kinematics (abs.), in Final Colloquium, Naturally fractured rock formations: Final Technical Programme, June 10-13, Liège, Belgium: International FRANCQUI Chair in exact sciences, unpaginated.

Reed, R. M., Laubach, S. E., and Hooker, J. N., 2003, The role of quartz-lined microfractures in sandstone diagenesis (abs.): Austin Geological Society Newsletter, v. 37, no. 6, p. 12-13.

Cumella, S. P., Laubach, S. E., Ortega, Orlando, Makowitz, Astrid, and Rijken, Peggy, 2002, Natural fracture and diagenetic controls on producibility of low permeability, Upper Cretaceous Williams Fork Formation sandstones, Piceance Basin, Colorado (abs.): American Association of Petroleum Geologists Annual Convention Official Program, v. 11, p. A37.

Gale, J. F. W., Laubach, S. E., Marrett, Randall, Olson, J. E., Holder, Jon, and Reed, R. M., 2002, Predicting and characterizing fractures in dolomite reservoirs: using the link between diagenesis and fracturing (abs.), in The geometry and petrogenesis of dolomite hydrocarbon reservoirs: Proceedings, Petroleum Studies Group: London, Burlington House, unpaginated.

Lander, R., Gale, J. F. W., Laubach, S. E., and Bonnell, L., 2002, Interaction between quartz

cementation and fracturing in sandstones (abs.): American Association of Petroleum Geologists Annual Convention Official Program, v. 11, p. A98-A99.

Laubach, S. E., Gale, J. F. W., and Olson, J., 2002, Are open fractures necessarily aligned with maximum horizontal stress? (abs.): American Association of Petroleum Geologists Annual Convention Official Program, v. 11, p. A100.

Laubach, S. E., Reed, R. M., Olson, J., Lander, R., and Bonnell, L., 2002, Interaction between diagenetic reactions and mechanics of opening-mode fractures in sandstones: the message from crack-seal texture (abs.): Geological Society of America Northeastern Section Meeting, Abstracts with Programs, v. 34, no. 1, p. A-10-A-11.

Laubach, Stephen, Gale, Julia, Olson, Jon, Bonnell, Linda, and Lander, Rob, 2002, Cement patterns control fracture porosity preservation in tight gas sandstones (abs.), in American Association of Petroleum Geologists International Meeting: Cairo, Egypt, October 27-30, p. 254.

Laubach, Stephen, Marrett, Randall, and Olson, Jon, 2002, Fracture characterization methods for tight gas sandstones (abs.), in American Association of Petroleum Geologists International Meeting: Cairo, Egypt, October 27-30, p. 255.

Philip, Z. G., Jennings, J. W., Jr., Olson, J., and Laubach, S. E., 2002, Modeling coupled fracture-matrix fluid flow in simulated fracture patterns (abs.): American Association of Petroleum Geologists Annual Convention Official Program, v. 11, p. A139.

Reed, R. M., Laubach, S. E., and Hooker, J. N., 2002, The role of quartz-lined microfractures in sandstone diagenesis (abs): Geological Society of America Abstracts with Programs, v. 34, no. 6, p. A372.

Reed, R. M., Laubach, S. E., Clift, S. J., Hooker, J. N., and Makowitz, Astrid, 2002, Macrofractures, microfractures, and fracture-cement relations in Permian sandstones from the Val Verde Basin, West Texas (abs.): Geological Society of America Abstracts with Programs, v. 34, no. 3, p. A11.

Laubach, S. E., 2001, Degradation beyond the emergent threshold (abs.): American Association of Petroleum Geologists Annual Convention Official Program, v. 10, p. A113.

Laubach, S. E., Olson, J., and Marrett, Randall, 2001, Quantitative Fracture Evaluation and Image Log Calibration, Rocky Mountain Region Deep Gas Plays: The University of Texas at Austin, Bureau of Economic Geology, unpaginated.

Lucia, F. J., Ruppel, S. C., Jennings, J. W., Jr., and Laubach, S. E., 2001, South Wasson reservoir model (abs.), in Viveiros, J. J., and Ingram, S. M., eds. The Permian Basin: microns to satellites: looking for oil and gas at all scales: West Texas Geological Society Publication 01-110, p. 91.

Lucia, F. J., Ruppel, S. C., Jennings, J. W., Jr., and Laubach, S. E., 2001, The importance of layering in reservoir characterization: South Wasson Clear fork reservoir, Gaines county, Texas (abs.), in Viveiros, J. J., and Ingram, S. M., eds., The Permian Basin: microns to satellites: looking for oil and gas at all scales: West Texas Geological Society Publication 01-110, p. 131.

Ortega, Orlando, Marrett, Randall, Laubach, S. E., Milliken, K. L., Olson, J., and Reed, R. M., 2001, Outcrop analogs for fractured reservoir characterization, Rangely field, Colorado (abs.): American Association of Petroleum Geologists Annual Convention Official Program, v. 10, p. A148.

Stowell, J. F. W., Laubach, S. E., Marrett, Randall, Olson, J., and Holder, Jon, 2001, Understanding fractured carbonate reservoirs (abs.): American Association of Petroleum Geologists Annual Convention, Extended Abstracts, CD-ROM.

Doherty, Eloise, and Laubach, S. E., 2000, Regional strain history from analysis of natural microfractures in quartz-rich sandstone sidewall cores using scanned cathodoluminescence: Geological Society of America, Abstracts with Programs, v. 32, no. 3, p. A-8.

Marrett, Randall, and Laubach, S. E., 2000, Isoclinal red herrings (abs.): Geological Society of America, Abstracts with programs, v. 32, no. 7.

Ortega, Orlando, Santiago, F. M., Marrett, Randall, and Laubach, S. E., 2000, Unraveling sedimentary controls on natural fracture development in hydrocarbon bearing facies of the Cupido Formation, northeastern New Mexico (abs.), in AAPG Annual Convention Official Program: American Association of Petroleum Geologists, p. A109-110.

Reed, R. M., and Laubach, S. E., 2000, Crack-seal texture in quartz-lined, opening-mode fractures formed in quartz-rich sandstones: an example of interrelated structure and diagenesis (abs.): Geological Society of America Abstracts with Programs, v. 32, no. 7, p. A229.

Laubach, S. E., and Doherty, Eloise, 1999, Natural fracture analysis using drilled sidewall cores (abs.), in AAPG Annual Convention official program: American Association of Petroleum Geologists, p. A77-A78. Also in Ameen, M. S., convenor, Fracture and in-situ stress characterization of hydrocarbon reservoirs, London: The Geological Society, unpaginated.

Laubach, S. E., and Marrett, Randall, 1999, Identification of controls on fracture permeability (abs.), in Ameen, M. S., convenor, Fracture and in-situ stress characterization of hydrocarbon reservoirs, London: The Geological Society, unpaginated.

Laubach, S. E., Marrett, Randall, and Olson, J., 1999, New fracture characterization methods for mature fields (ext. abs.), in Revitalización de provincias petrolíferas maduras, Tercera Conferencia Internacional Conjunta, Veracruz, Mexico: Asociacion Mexicana de Geologos Petroleros and American Association of Petroleum Geologists, 6 p., CD-ROM.

Laubach, S. E., Marrett, Randall, and Stowell, J. F. W., 1999, Controls on fracture permeability (abs.), in Proceedings, Fractures and in situ stress characterization: The Geological Society, Burlington House, Petroleum Group, unpaginated.

Reed, R. M., and Laubach, S. E., 1999, Fracturing and quartz cementation in sandstone compaction bands: preliminary results from cathodoluminescence studies (abs.): Geological Society of America Abstracts with Programs, v. 31, no. 6, p. A87.

Laubach, S. E., 1998, Fractures in rock (abs.), in Proceedings, The Woodworth Conference: Geological Society of London, unpaginated.

Marrett, Randall, Laubach, S. E., Rossen, William, Olson, J., and Lake, L. W., 1998, Integration of new fracture observation, characterization, and fluid-flow modeling technology (abs.), in Bridges to discovery: extended abstracts, volume 2, AAPG Annual Convention: American Association of Petroleum Geologists Bulletin, p. A431.

Marrett, Randall, Rossen, William, and Laubach, S. E., 1998, Integration of new technologies for fracture observation, characterization, and fluid-flow modeling (abs.), in Hoak, T. E., symposium coordinator, Fractured reservoirs: practical exploration and development strategies: Rocky Mountain Association of Geologists Annual Meeting, p. 319.

Reed, R. M., and Laubach, S. E., 1998, Density and distribution of microfractures in sandstones: importance to diagenesis (abs.): American Association of Petroleum Geologists Abstracts, CD-ROM, 542.PDF.

Johns, M. K., Laubach, S. E., and Milliken, K. L., 1997, Syncementation crack-tip and crack-seal microtextures and their implications for fracture connectivity and porosity interpretation (abs.): American Association of Petroleum Geologists Annual Meeting (Abstracts), p. A56.

Johns, M. K., Laubach, S. E., and Milling, M. E., 1997, Syncementation crack-tip and crack-seal microtextures and their implications for fracture connectivity and porosity interpretation (abs.): American Association of Petroleum Geologists Annual Convention Official Program, v. 6, p. A56.

Laubach, S. E., 1997, Fracture properties from rock microstructure (abs.), in Higgs, William, and Kluth, Charles, conveners, AAPG Hedberg Research Conference: Reservoir scale deformation: characterization and prediction: American Association of Petroleum Geologists, p. 1.

- Laubach, S. E., 1997, New core analysis methods for fractured siliciclastic reservoirs (abs.): American Association of Petroleum Geologists Annual Convention Official Program, v. 6, p. A67.
- Laubach, S. E., and Marrett, Randall, 1997, Inferring fracture permeability from rock microstructure (abs.): American Association of Petroleum Geologists Bulletin, v. 81, no. 8, p. 1393-1394.
- Marrett, Randall, and Laubach, S. E., 1997, Diagenetic controls on fracture permeability and sealing (abs.): International Journal of Rock Mechanics and Mining Science, v. 34, no. 3/4, p. 409.
- Marrett, Randall, Ortega, Orlando, Reed, R. M., and Laubach, S. E., 1997, Predicting macrofracture permeability from microfractures (abs.): American Association of Petroleum Geology Annual Meeting Official Program, v. 6, p. A76.
- Laubach, S. E., 1996, Fracturing and diagenesis as coupled processes (abs.): Geological Society of America, Abstracts with Programs, v. 28, no. 7, p. A-136-137.
- Laubach, S. E., and Milliken, K. L., 1996, Using CL observations to evaluate fractures in siliciclastic petroleum reservoirs (abs.): International Conference on Cathodoluminescence and Related Techniques in Geosciences and Geomaterials, Nancy, France, p. 83-84.
- Laubach, S. E., Milliken, K. L., Clift, S. J., Burns, Sara, and Reed, R. M., 1996, New subsurface fracture characterization methods for siliciclastic rocks (abs.): Geological Society of America, South-Central Section Meeting, Abstracts with Programs, v. 28, no. 1.
- Laubach, S. E., Schultz-Ela, D., and Tyler, Roger, 1996, Differential compaction of interbedded sandstones and coal (abs.), in Cosgrove, J. W., and Ameen, M. S., convenors, Forced (draped) folds and associated fractures: The Geological Society of London, unpaginated.
- Reed, R. M., and Laubach, S. E., 1996, The role of microfractures in the development of quartz overgrowth cements in sandstones: new evidence from cathodoluminescence studies (abs.): Geological Society of America Abstracts with Programs, v. 28, no. 7, p. A280.
- Johns, M. K., Laubach, S. E., and Milliken, K. L., 1995, New microtextural evidence of syncementation fracturing in sandstone (abs.): Geological Society of America Abstracts with Programs, v. 27, no. 6, p. A-216.
- Hamlin, H. S., Clift, S. J., Dutton, S. P., Hentz, T. F., and Laubach, S. E., 1994, Geologically complex gas reservoirs in slope and basin facies, Canyon sandstones, Val Verde Basin, southwest Texas (abs.): Houston Geological Society Bulletin, v. 37, no. 1, p. 11.
- Laubach, S. E., Nance, H. S., and Dutton, A. R., 1994, Fault and joint spacing in a normal fault zone (abs.): Eos (Supplement), v. 75, no. 44, p. 678.
- Laubach, S. E., Schultz-Ela, D., and Tyler, Roger, 1994, Differential compaction and shifts in coal fracture patterns: field example and finite element model (abs.): American Association of Petroleum Geologists Annual Convention Abstracts, v. 3, p. 193-194.
- Laubach, S. E., Tyler, Roger, Schultz-Ela, D., and Tremain, C. M., 1994, Tectonic analysis of weakly deformed foreland areas (abs.): American Association of Petroleum Geologists Annual Convention Abstracts, v. 3, p. 194.
- Nance, H. S., Laubach, S. E., and Dutton, A. R., 1994, Fault and joint measurements in Austin Chalk, Superconducting Super Collider site, Texas (abs.): American Association of Petroleum Geologists Bulletin, v. 78, no. 9, p. 1472.
- Tyler, Roger, Laubach, S. E., Schultz-Ela, D., and Tremain, C. M., 1994, Variations in Cretaceous and Tertiary coal fracture patterns, Rocky Mountain Foreland, western United States (abs.): Geological Society of America Abstracts with Programs, v. 26, no. 7, p. A-209.
- Dutton, S. P., and Laubach, S. E., 1993, Geology of major low-permeability sandstone gas reservoirs in the continental United States (abs.): Geological Society of America Abstracts with

Programs, v. 25, no. 6, p. A-300.

Finley, R. J., Levey, R. A., and Laubach, S. E., 1993, Geological controls on access to lower 48 natural gas resources (abs.): Geological Society of America Abstracts with Programs, v. 25, no. 6, p. A-299.

Laubach, S. E., 1993, Stress directions near a stress province boundary (abs.): Eos, v. 74, no. 43, p. 102.

Laubach, S. E., Tyler, Roger, Ambrose, W. A., and Tremain, C. M., 1993, Preliminary map of fracture patterns in coal in the western United States (abs.): International Journal of Rock Mechanics and Mining Sciences and Geomechanics Abstracts, v. 30, no. 3, p. 167A.

Clift, S. J., Laubach, S. E., and Holder, Jon, 1992, Strength anisotropy in low-permeability sandstone gas reservoir rocks application of the axial point-load test (abs.): American Association of Petroleum Geologists Bulletin, v. 76, no. 9, p. 1454.

Collins, E. W., Laubach, S. E., Dutton, S. P., and Hill, R. E., 1992, Depositional environments, petrology, and fractures of the Atoka Davis Sandstone: a low-permeability gas-bearing sandstone of the Fort Worth Basin, North-Central Texas (abs.): American Association of Petroleum Geologists Bulletin, v. 76, no. 4, p. 574.

Laubach, S. E., and Lorenz, J. C., 1992, Natural fracture patterns in sandstones of the Frontier Formation, southwestern Wyoming (abs.): American Association of Petroleum Geologists Bulletin, v. 76, no. 8, p. 1262.

Laubach, S. E., and Marin, B. A., 1992, Opportunities for horizontal drilling in fractured low-permeability sandstones, United States (abs.), in Horizontal Drilling Symposium: domestic and international case studies: Rocky Mountain Association of Geologists, unpaginated.

Laubach, S. E., Clift, S. J., and Holder, Jon, 1992, Using indentation (axial point-load) tests to evaluate strength anisotropy and stress directions in low-permeability gas reservoir sandstones (abs.): American Association of Petroleum Geologists Bulletin, v. 76, no. 8, p. 1262.

Ayers, W. B., Jr., Ambrose, W. A., Kaiser, W. R., Laubach, S. E., Scott, A. R., Yeh, J. S., Tremain, C. M., and Whitehead, N. H., III, 1991, Geologic and hydrologic characterization of coalbed methane reservoirs, Fruitland Formation, San Juan Basin, Colorado and New Mexico (abs.): American Association of Petroleum Geologists Bulletin, v. 75, no. 3, p. 535.

Dutton, S. P., Laubach, S. E., and Tye, R. S., 1991, Depositional, diagenetic, and structural controls on reservoir properties of low-permeability sandstone, Travis Peak Formation, East Texas (abs.): American Association of Petroleum Geologists Bulletin, v. 75, no. 9, p. 1521.

Finley, R. J., Laubach, S. E., Tyler, Noel, and Holtz, M. H., 1991, Opportunities for horizontal drilling in Texas (abs.): American Association of Petroleum Geologists Bulletin, v. 75, no. 3, p. 574.

Fryer, K. H., Weaver, K., and Laubach, S. E., 1991, Apparent inverse metamorphic gradient below a Cretaceous thrust sheet in the eastern Maria fold-and-thrust belt, western Arizona (abs.): Geological Society of America Abstracts with Programs, v. 23, no. 5, p. A235.

Laubach, S. E., 1991, Core and outcrop observations of fracture attributes (abs.), in Expanded abstracts of the technical program with authors' biographies: Houston, Society of Exploration Geophysicists, 61st annual international meeting and exposition, v. 2, p. 1642.

Laubach, S. E., 1991, Distribution and origin of regional coal fracture (cleat) domains in Upper Cretaceous Fruitland Formation coal: possible effects on coalbed stimulation and methane production (abs.): American Association of Petroleum Geologists Bulletin, v. 75, no. 3, p. 618.

Laubach, S. E., 1991, Fracture swarms in low-permeability-sandstone gas reservoir rocks in New Mexico, Colorado, and Wyoming: implications for exploration and development (abs.): American Association of Petroleum Geologists Bulletin, v. 75, no. 6, p. 1130-1131.



Laubach, S. E., Tremain, C. M., and Whitehead, N. H., III, 1991, Regional coal fracture domains in Upper Cretaceous Fruitland Formation coal, San Juan Basin: implications for gas exploration and development (abs.): Geological Society of America Abstracts with Programs, v. 23, no. 4, p. 40-41.

Laubach, S. E., Tyler, Roger, Tremain, C. M., Grout, M. A., and Ambrose, W. A., 1991, Fracture patterns in coal in the western United States: observations and implications for development of coalbed methane resources (abs.): Geological Society of America Abstracts with Programs, v. 23, no. 5, p. A38-A39.

Buehring, R., Laubach, S. E., and Hamlin, H. S., 1990, Stratigraphic analysis of fluvial and marine sandstone with borehole-imaging geophysical logs and core (abs.): Geological Society of America Abstracts with Programs, v. 22, no. 7, p. A47.

Laubach, S. E., Tremain, C. M., Whitehead, N. H., III, and Baumgardner, R. W., Jr., 1990, Fracture-trace maps of upper Pictured Cliffs Sandstone pavements, San Juan Basin, Colorado: implications for coalbed methane exploration (abs.): Geological Society of America Abstracts with Programs, v. 22, no. 7, p. A202.

Laubach, S. E., Vendeville, B. C., and Reynolds, S. J., 1990, Downward-steepening normal faults (abs.): Geological Society of America Abstracts with Programs, v. 22, no. 7, p. A114-A115.

Reynolds, S. J., Spencer, J. E., Laubach, S. E., and Richard, S. M., 1990, Mesozoic evolution of western Arizona (abs.): Geological Society of America Abstracts with Programs, v. 22, no. 3, p. 77.

Henry, C. D., Price, J. G., Rubin, J. N., and Laubach, S. E., 1989, The Bracks Rhyolite: a large-volume, extensive silicic lava of Trans-Pecos Texas (abs.): Geological Society of America, South-Central Section, Abstracts with Programs, v. 21, no. 1, p. 14.

Laubach, S. E., 1989, Evolution of normal fault block shape in space and time (abs.), in Structural and tectonic modeling and its application to petroleum geology: Norwegian Petroleum Society, Abstracts, p. 24.

Laubach, S. E., 1989, Origin of extension fractures in sandstone from a passive margin basin (abs.), in Proceedings, Deformation Mechanisms, Rheology, and Tectonics Conference, Leeds, England: The University of Leeds, unpaginated.

Laubach, S. E., and Boardman, S., 1989, Multiple generations of fluid inclusions in Cretaceous quartz veins from the Gulf of Mexico basin (abs.): Geological Society of America, Abstracts with Programs, v. 21, no. 6, p. A64.

Laubach, S. E., Baumgardner, R. W., Jr., Monson, E. R., Hunt, E., and Meador, K. J., 1989, Fracture detection in low-permeability reservoir sandstone: comparison of BHTV and FMS logs to core (abs.): American Association of Petroleum Geologists Bulletin, v. 73, no. 3, p. 378.

Laubach, S. E., Hoak, T. E., Dutton, S. P., and Diggs, T. N., 1989, Coevolution of fracture pattern, rock mechanical properties, and diagenesis in a low-permeability gas reservoir sandstone, East Texas (abs.): Geological Society of America, South-Central Section, Abstracts with Programs, v. 21, no. 1, p. 16.

Laubach, S. E., Reynolds, S. J., and Raney, J. A., 1989, Normal fault geometry: examples from above the Buckskin detachment fault, Arizona (abs.): Geological Society of America, Abstracts with Programs, v. 21, no. 6, p. A202.

Jackson, M. L. W., and Laubach, S. E., 1988, Cretaceous and Tertiary compressional tectonics as cause of Sabine Arch, eastern Texas and northwestern Louisiana (abs.): American Association of Petroleum Geologists Bulletin, v. 72, no. 9, p. 1114.

Laubach, S. E., 1988, Brittle microstructure of folded quartzite (abs.): Eos, v. 69, no. 16, p. 472.

Laubach, S. E., 1988, Origin of natural fractures in sandstone from a passive margin basin (abs.): *Eos*, v. 69, no. 44, p. 1433.

Laubach, S. E., 1988, Significance of natural and coring-induced fractures in the Travis Peak Formation for reservoir stimulation (ext. abs.): *Gulf Coast Association of Geological Societies Transactions*, v. 38, p. 591.

Laubach, S. E., 1988, Significance of natural and coring-induced fractures in Travis Peak Formation for reservoir stimulation (abs.): *American Association of Petroleum Geologists Bulletin*, v. 72, no. 9, p. 1115.

Baumgardner, R. W., Jr., and Laubach, S. E., 1987, Wellbore ellipticity in East Texas: in situ stress or fracture-related spalling? (abs.): *Eos*, v. 68, no. 44, p. 1460.

Jackson, M. L. W., and Laubach, S. E., 1987, Evidence for Sevier and Laramide deformation in the Gulf of Mexico basin (abs.): *Geological Society of America, Abstracts with Programs*, v. 19, no. 5, p. 285.

Laubach, S. E., 1987, Characteristics of subsurface natural fractures in East Texas (abs.): *Eos*, v. 68, no. 16, p. 428.

Laubach, S. E., 1987, Mapping subsurface fracture trends (abs.): *Eos*, v. 68, no. 16, p. 299.

Reynolds, S. J., Spencer, Jon, Monson, E. R., Laubach, S. E., and Richard, S. M., 1987, Mesozoic structural evolution of the Maria fold and thrust belt, west-central Arizona and southeastern California (abs.): *Geological Society of America, Abstracts with Programs*, v. 19, no. 7, p. 818.

Laubach, S. E., 1986, Influence of fault-propagation patterns on basin shape (abs.), in *Symposium--Basins of Eastern Canada and Worldwide Analogs*, Halifax, Nova Scotia, Programme with Abstracts: Atlantic Geoscience Society, p. 66.

Laubach, S. E., 1986, Interpretation of minor fold vergence in slate (abs.): in *Program & abstracts of papers; 62nd annual meeting, Pennsylvania Academy of Science; joint meeting with the Penna. Chapter, Wildlife Society, Anonymous*; *Newsletter-Pennsylvania Academy of Science*, v. 44, no. 2, p. 16.

Laubach, S. E., and Griffiths, W., 1986, True "fracture cleavage" in the Palmerton sandstone, eastern Pennsylvania (abs.): *Geological Society of America, Abstracts with Programs*, v. 18, no. 6, p. 667.

Laubach, S. E., and Sirois, B., 1986, Patterns of cleavage development in slate (abs.), in *Program & abstracts of papers; 62nd annual meeting, Pennsylvania Academy of Science; joint meeting with the Penna. Chapter, Wildlife Society, Anonymous*; *Newsletter-Pennsylvania Academy of Science*, v. 44, no. 2, p. 22.

Laubach, S. E., Reynolds, S. J., Spencer, Jeff, and Richard, S. M., 1986, Thrust-related metamorphism, Granite Wash Mountains, west-central Arizona (abs.): *Geological Society of America, Abstracts with Programs*, v. 18, no. 2, p. 126.

Laubach, S. E., Sirois, B., and Ryberg, P., 1986, Evidence of large-scale banded volume-loss structures parallel to cleavage in the Martinsburg slate (abs.): *Geological Society of America, Abstracts with Programs*, v. 18, no. 1, p. 29.

Richard, S. M., Reynolds, S. J., Spencer, L., and Laubach, S. E., 1986, Regionally penetrative gently-dipping faults and fabrics, Harcuvar complex, west-central Arizona (abs.): *Geological Society of America, Abstracts with Programs*, v. 18, no. 5, p. 406.

Laubach, S. E., and Marshak, S., 1985, Fault patterns generated during extension of crystalline basement (abs.): *Geological Society of America, Abstracts with Programs*, v. 17, no. 7, p. 640.

Marshak, S., Anderson, J. L., and Laubach, S. E., 1985, Modes of fracture propagation and water-rock interaction in extensional regimes (abs.), in *Proceedings, Conference on Continental*

Extensional Tectonics, Durham, England, unpaginated.

Laubach, S. E., 1984, Controls of fault evolution and basin geometry in Mesozoic rifts: a case study (abs.): Geological Society of America, Abstracts with Programs, v. 16, no. 2, p. 106.

Laubach, S. E., 1984, Flow structures in an endogenous rhyolite dome (abs.): Geological Society of America, Abstracts with Programs, v. 16, no. 5, p. 294.

Laubach, S. E., 1983, Origin of flow banding in rhyolite and the role of shear zones (abs.): Geological Society of America, Abstracts with Programs, v. 15, no. 4, p. 258.

## Service

### University Committees

Member, Appointments Committee, Jackson School of Geosciences, The University of Texas at Austin, 2015-2018

Member, Graduate Studies Committee, Energy and Earth Resources Graduate Program, Jackson School of Geosciences, 2006-Present

Member, Graduate Studies Committee, The University of Texas at Austin, Energy and Earth Resources Program, 2006-Present

### External Committees Participation

Member, Distinguished Lecture Committee, American Association of Petroleum Geologists, May 5, 2015-Present

Member, Council on Chemical Sciences, Geosciences, and Biosciences, U.S. Department of Energy, Office of Science, 2015-Present

Member, Campaign Steering Committee, Campaign for GSA's Future, Geological Society of America Foundation, September 8, 2014-Present

Board member, Editorial Advisory Board, Journal of Structural Geology, August 19, 2014-Present

Moderator, PetroWiki, SPE, May, 2013 - present

Member, Foundation Weeks Award Committee, American Association of Petroleum Geologists, 2013-Present

Associate Editor, SPE Reservoir Evaluation & Engineering, Society of Petroleum Engineers, 2012 - present

Fellow, Charles Taylor Fellowship, American Association of Petroleum Geologists, 2012-Present

Member, Foundation Fundraising Advisory Committee, American Association of Petroleum Geologists, 2012 - present

Member, Foundation Trustee Associates, American Association of Petroleum Geologists, 2010 - present

Member, Council on Undergraduate Research, , 2008 - present

Member, Editorial Board, The Open Petroleum Engineering Journal, 2008 - Present

Trustee, GDL Foundation, 2007 - present

Member, Graduate Studies Committee, The University of Texas at Austin, Department of Geological Sciences, 2003 - present

Member, Editorial Review Committee, Society of Petroleum Engineers SPE Reservoir Evaluation & Engineering, 1998 - present

Reviewer, AAPG Bulletin, Journal of Geophysical Research, Journal of Petroleum Technology,

Journal of Structural Geology, GSA Bulletin, American Association of Petroleum Geologists

Member, University of Illinois Department of Geology Alumni Board, Oversight of department/visiting committee, August 1, 2016-August 1, 2019

Member, Reservoir Description and Dynamics Advisory Committee, Society of Petroleum Engineers, September 1, 2015-September 1, 2018

Member, Scientific Committee, 21st International Conference on Deformation Mechanisms, Rheology and Tectonics, January 1, 2014-May 6, 2017

Session chair, Poster Session Theme 4: Fault Seal and Fault Zone Modeling, AAPG 2017 Annual Convention & Exhibition, Houston, Tex., April 2-5, 2017

Executive Editor, Society of Petroleum Engineers Reservoir Evaluation & Engineering, December 1, 2015-September 29, 2016

Associate Editor, Interpretation, SEG-AAPG journal, 2014-2016

Session organizer and chair, Symposium, Brittle Structures of Rocky Mountain Reservoirs and Reservoir Analogs, Rocky Mountain GSA Section Meeting, Casper, Wyoming, May 2015

Member, American Association of Petroleum Geologists, Petroleum Structure & Geomechanics Division Steering Committee, 2013-2015

Member, Council on Earth Sciences, U.S. Department of Energy, Office of Science, 2013-2015

Session chair, Geosciences Principal Investigators Symposium, Basic Energy Sciences, U.S. Department of Energy, May 2014

Reviewer, ORAU, International Program, U.S. Department of Energy, 2014

Technical Session Advocate and Chair, Structural Geology and Geomechanics in the Petroleum Industry, Oral and Poster sessions, GSA Annual Meeting, Denver, September, 2013

Reviewer, Abstract submissions, 2014 Houston ACE in Theme 8--Structure, Tectonics, and Geomechanics, July, 2013

Elected Editor, American Association of Petroleum Geologists, Responsible for all American Association of Petroleum Geologists scientific publishing including book series, two journals and electronic publications, etc. Involved in all aspects of leadership, planning, and management of this professional society, 2010-July 2013

Liaison to Datapages, Inc., Executive Committee, American Association of Petroleum Geologists, 2010-July 2013

Liaison to GIS Committee, Executive Committee, American Association of Petroleum Geologists, 2010-July 2013

Liaison to Publications Committee, Executive Committee, American Association of Petroleum Geologists, 2010-July 2013

Liaison to Publications Pipeline Subcommittee, Executive Committee, American Association of Petroleum Geologists, 2010-July 2013

Liaison to Technical Advisory Committee, Executive Committee, American Association of Petroleum Geologists, 2010-July 2013

Member, AAPG Executive Committee, 2010-July 2013

Theme chair, Fracture characterization, Unconventional Resources Technology Conference (URTeC), American Association of Petroleum Geologists, 2013

Member, Advisory Council Ad Hoc Committee on Divisions, AAPG, 2012

Reviewer, Office of Science Graduate Fellowship Program, Department of Energy, 2012

Technical Session Advocate and Chair, The Role of Structure and Diagenesis in Governing Fluid Storage and Flow in Deep Sedimentary Basins with Applications to Unconventional Oil and Gas Reservoirs, Geological Society of America Annual Meeting, Charlotte, NC, Geological Society of America, 2011-2012, 2012

Volume Editor, Special Publication, Advances in Carbonate Exploration and Reservoir Analysis, Geological Society of London, 2012

Distinguished Lecturer, American Association of Petroleum Geologists, 2011-2012

Reviewer, Office of Science, Basic Energy Sciences (BES) Early Career Research Program, U.S. Department of Energy, 2011 - 2012

Technical Session Advocate and Chair, Annual Meeting, Charlotte, North Carolina, Invited Keynote Session, Geological Society of America, 2011 - 2012

Member, Committee to Assess the Science Proposed for a Deep Underground Science and Engineering Laboratory, National Research Council, 2010 - 2012

Co-opted Member, Petroleum Group Committee, Geological Society of London, 2008 - 2012

Member, Executive Director Search Committee, American Association of Petroleum Geologists, 2011

Associate Editor, American Association of Petroleum Geologists Bulletin, 2010 - 2011

Convener, Advances in Carbonate Exploration and Reservoir Analysis, Geological Society of London November, 2010

Convener, The Geology of Unconventional Gas Plays, Geological Society of London October, 2010

Co-Chair and Session Organizer, Theme Session: New Perspectives in Fractured Reservoirs, 2011 AMPG-GCAGS meeting, Veracruz, Mexico July, 2010

Convener, Theme Session, Fracturing and Cementation: Geochemical and Mechanical Feedback Processes, Goldschmidt June, 2010

Elected Editor, American Association of Petroleum Geologists, 2010

Liaison to Datapages, Inc., Executive Committee, American Association of Petroleum Geologists, 2010

Liaison to GIS Committee, Executive Committee, American Association of Petroleum Geologists, 2010

Liaison to Publications Committee, Executive Committee, American Association of Petroleum Geologists, 2010

Liaison to Publications Pipeline Subcommittee, Executive Committee, American Association of Petroleum Geologists, 2010

Liaison to Technical Advisory Committee, Executive Committee, American Association of Petroleum Geologists, 2010

Member, DUSEL (Deep Underground Science and Engineering Laboratory, located at the Homestake Mine in Lead, South Dakota) Committee, National Research Council, 2010

Reviewer, Office of Science Graduate Fellowship Program, Department of Energy, 2010

Guest Editor, theme issue (2010, v. 32, no. 12), Journal of Structural Geology, 2009 - 2010

Session Developer, Session Developer, U.S. Rock Mechanics, 44th Annual Symposium, 2009-2010, 2009 - 2010

Session Developer, U.S. Rock Mechanics, 44th Annual Symposium, Society of Petroleum

Engineers, 2009-2010

Member, Editorial Board, International Journal of Physical Sciences, 2008 - 2010

Deputy Chair and Member, Symposium Academic Committee, Fifth International Symposium on Formation and Accumulation Mechanisms of Petroleum and Evaluation of Petroleum Resources, China State Key Laboratory of Petroleum Resource and Prospecting, Beijing, China, October 2009

Deputy Chair and Member, Symposium Academic Committee, Fifth International symposium on Formation and Accumulation Mechanisms of Petroleum and Evaluation of Petroleum Resources, China State Key Laboratory of Petroleum Resource and Prospecting, Beijing, China, October, 2009

Chair, Energy Geoscience Education and Research Group, Jackson School of Geosciences, 2008 - 2009

Member, Admissions Committee, Jackson School of Geosciences, 2008 - 2009

Member and Vice Chair, Energy, Environment, Environment and Policy Theme Faculty Search Committee, The University of Texas at Austin, Jackson School of Geosciences, 2007 - 2009

Member, Centennial Committee, Bureau of Economic Geology, 2007 - 2009

Member and Vice Chair, Energy, Environment, Environment and Policy Theme Faculty Search Committee, Jackson School of Geosciences, 2006-2009

Member-at-Large, Academic & Applied Geosciences Relations Committee, Geological Society of America, 2006 - 2009

Member, Equipment Committee, John A. and Katherine G. Jackson School of Geosciences, The University of Texas at Austin, 2003-2009

Co-President, Brittle Deformation and Diagenesis as Coupled Processes Session, 2008 Joint Annual Meeting, Geological Society of America, GCAGS, October, 2008

Session Chair and Discussion Leader, Open Fractures and In Situ Stress, Casper, Wyoming, American Association of Petroleum Geologists Hedberg Conference, 2008

Session Chair and Organizer, Integration of Structural Geology and Diagenesis, 2008 American Association of Petroleum Geologists Annual Convention, San Antonio, 2008

Theme Session Chair and Organizer, Brittle Deformation and Diagenesis as Coupled Processes, 2008 Geological Society of America Annual Meeting, Houston, 2008

Theme Session Chair and Organizer, Brittle Deformation and Diagenesis as Coupled Processes, Geological Society of America Annual Meeting, Houston, Texas, Geological Society of America, 2008

Member, Panel on energy and mineral resources policy, Geological Society of America, 2007 - 2008

Member, Panel preparing position statement on energy and mineral resources policy, Geological Society of America, 2007 - 2008

Member, ex officio, Grants and Awards Committee, Bureau of Economic Geology, 2006 - 2008

Member, ex officio, Publication Board, Bureau of Economic Geology, 2006 - 2008

Member, Equipment Committee, Jackson School of Geosciences, The University of Texas at Austin, 2003-2008

Member, Graduate Curriculum Committee, Jackson School of Geosciences, 2007

Member, Strategic Planning Council, John A. and Katherine G. Jackson School of Geosciences, The University of Texas at Austin, 2007

Session Chair and Organizer, Structurally Complex Reservoirs: Reactivation and Superposition, 2007 American Association of Petroleum Geologists Annual Meeting, Long Beach, California, 2007

Member, Appointments Committee, John A. and Katherine G. Jackson School of Geosciences, The University of Texas at Austin, 2005 - 2007

Chair, Academic Liaison Committee, American Association of Petroleum Geologists, 2004 - 2007

Member, Student Focus Ad Hoc Committee, American Association of Petroleum Geologists, 2004 - 2007

Member, Research Committee, American Association of Petroleum Geologists, 1997-2007

Member, Academic and Applied Geosciences Relations Committee, Geological Society of America, 2006

Senior Technical Advisor, Bureau of Economic Geology, 2006

Session Chair, Fractured Clastics and Carbonates--What Constrains Their Reservoir Limits? (Oral and Poster Sessions), AAPG National Convention, American Association of Petroleum Geologists, Houston, Texas, 2006

Session Chair, Fractured Clastics and Carbonates--What Constrains Their Reservoir Limits? (Oral and Poster Sessions), 2006 American Association of Petroleum Geologists Annual Meeting, Dallas, 2006

Chair, Equipment Committee, John A. and Katherine G. Jackson School of Geosciences, The University of Texas at Austin, 2005 - 2006

Chair, Promotion Advisory Committee, Bureau of Economic Geology, 2005 - 2006

Member, Editorial Board, SPE Reservoir Evaluation and Engineering, Society of Petroleum Engineers, 1999 - 2006

Member, JSG Fellowship Committee, , 2004 - 2005

Member, SPE Forum Series Steering Committee, Future Challenges in Carbonate Resource Development, Society of Petroleum Engineers, 2004 - 2005

Member, Promotion Advisory Committee, Bureau of Economic Geology, 2003 - 2005

Session Chair and Abstracts Review, American Association of Petroleum Geologists Annual Meeting, 2003 - 2005

SPE Distinguished Lecturer, Tours of United States, Mexico, East Asia, January, 2004

Co-Convener, Hedberg Research Conference, American Association of Petroleum Geologists, 2004

Chair, Academic Liaison Subcommittee to identify AAPG contacts at colleges and universities, American Association of Petroleum Geologists, 2002 - 2004

Webmaster, Research Committee, American Association of Petroleum Geologists, 2002 - 2004

Member, Distinguished Lecture Committee, American Association of Petroleum Geologists, 2001 - 2004

Vice-Chair, Research Committee, American Association of Petroleum Geologists, 2001-2004

Instructor, American Association of Petroleum Geologists Fractured Reservoirs School, 1999 - 2004

Lecturer and Member, Visiting Geologists Program, American Association of Petroleum Geologists, 1999 - 2004

Vice-Chair, Research Committee, American Association of Petroleum Geologists, 1997 - 2004

Session Chair and Session Developer, Gulf Coast Association of Geological Societies 52nd Annual Convention, Austin, Texas, October, 2002

Judge, American Association of Petroleum Geologists Annual Meeting, 2002

Associate Editor, American Association of Petroleum Geologists Bulletin, 1999 - 2002

Chair, Research Group--Reservoir Deformation Subcommittee, American Association of Petroleum Geologists, 1999 - 2002

Research Committee liaison, Research Group--Subcommittee on Reservoir Deformation, American Association of Petroleum Geologists, 1999-2002

Member, Publication Task Force, Bureau of Economic Geology, 2001

Member, Technical Advisory Board, Bureau of Economic Geology, 2000 - 2001

Session Developer, U.S. Rock Mechanics, 38th Annual Symposium, 2000 - 2001

Session Developer, U.S. Rock Mechanics, 38th Annual Symposium, Society of Petroleum Engineers, 2000-2001

Chair, Seminar Series, Bureau of Economic Geology, 2000

Member, Academic Liaison Committee, American Association of Petroleum Geologists, 2000

Chair and Co-Convenor, Exploration and exploitation of fractured reservoirs, oral sessions I and II, technical sessions, American Association of Petroleum Geologists Annual Convention, San Antonio, Texas, 1999

Chair, Exploration and exploitation of fractured reservoirs, poster session, American Association of Petroleum Geologists Annual Convention, San Antonio, Texas, 1999

Chair, Publication Policy Review Committee, Bureau of Economic Geology, 1999

Lecturer and Member, Visiting Geologists Program, American Association of Petroleum Geologists, 1999

Session Chair, Micromechanics and Fracturing Micromechanics and Flow Symposium, Santa Fe, New Mexico, U. S. Department of Energy, 1999

Invited Research Program Reviewer, Energy Studies, Santa Fe, New Mexico, Department of Energy, 1998

Panelist, American Rock Mechanics Association, Issues in Rock Mechanics, Asilomar, 1998

Reviewer, Department of Energy Basic Energy Sciences program proposals, U.S. Department of Energy, 1998

Technical Editor, SPE Reservoir Evaluation & Engineering, Society of Petroleum Engineers, 1998

Member, Editorial Board, SPE Formation Evaluation, Society of Petroleum Engineers, 1996 - 1998

Technical Session Advocate and Chair, T190. Applications of Structural Geology and Geomechanics in the Petroleum Industry, Geological Society of America, Annual Meeting, Vancouver, BC, 2014

Chair, AAPG Reservoir Deformation Research Group, American Association of Petroleum Geologists, 1997

Co-Chair and Session Developer, and Chair of Poster Session, New Technology in the Exploration and Exploitation of Fractured Reservoirs, AAPG National Convention, American Association of Petroleum Geologists, Dallas, Texas, 1997



Founder and first chair, AAPG Reservoir Deformation Research Group, inaugural meeting, American Association of Petroleum Geologists, (in 2013 this group became an AAPG technical division), 1997

Invited Session Co-Chair and Session Developer, and Chair of Poster Session, New Technology in the Exploration and Exploitation of Fractured Reservoirs, AAPG National Convention, Dallas, Texas, American Association of Petroleum Geologists, 1997

Session Co-Chair and Session Developer, and Chair of Poster Session, New Developments in Formation Evaluation Techniques and Technology, AAPG National Convention, Dallas, Texas, American Association of Petroleum Geologists, 1997

Symposium Organizer and Chair, Fractured Aquifers and Petroleum Reservoirs, South-Central Meeting, Austin, Texas, Geological Society of America, 1996

Session Chair and Session Developer, Second North American Rock Mechanics Symposium, 1995 - 1996

Theme Session Organizer, Scale Effects of Fluid Flow and Fractures, Geological Society of America Annual Meeting, Denver, Colorado, Geological Society of America, 1995 - 1996

Member, Editorial Review Committee, Society of Petroleum Engineers, 1995

Member, Coordinating Committee, Geotechnical Research Facility, On-Site Utilization of Major Assets Developed for the Superconducting Super Collider, 1994

Co-Chairman, The First North American Rock Mechanics Symposium (NARMS), Austin, Texas, 1992 - 1994

Member, Committee on Advanced Drilling Technologies, National Research Council, 1992 - 1994

Theme Session Advocate and Technical Session Chair, Geology of Natural Gas: Challenges and Opportunities, Annual Meeting, Boston Massachusetts, Geological Society of America, 1993

Member, Technical Program Committee, Rocky Mountain Regional and Low-Permeability Reservoir Symposium, Denver, Colorado, Joint Society of Petroleum Engineers, 1992 - 1993

Convener and Co-Chair, Bureau of Economic Geology Natural Fracture Workshop, Austin, Texas, Gas Research Institute, 1992

Discussion Facilitator, Research Needs of Green River Basin Gas Production: GRI/DOE Greater Green River Basin Natural Gas Technology Workshop, Denver, Colorado, Gas Research Institute, 1992

Judge, Structural Geology Session, Rocky Mountain Regional Meeting, Casper, Wyoming, American Association for the Advancement of Science, 1992

Member, various dissertation and thesis committees, DGS and P&GSE, 1992

Organizer and Chair (Invited Symposium), Coalbed Methane in the San Juan Basin, Rocky Mountain / South-Central Combined Meeting, Albuquerque, New Mexico, Geological Society of America, 1991

Discussion Leader, Geology of the Travis Peak Formation, Gas Research Institute Forum / Workshop in Association with The Society of Petroleum Engineers Gas Technology Symposium, Dallas, Texas, Gas Research Institute, 1989

Session Chairman, Structural Geology / Tectonics, South-Central Meeting, Arlington, Texas, Geological Society of America, 1989

Session Chairman, Structural Geology, American Geophysical Union Meeting, San Francisco, California, American Geophysical Union, 1988

Conference Organizer, (with Finley, R. J.) Fracture Workshop, Gas Research Institute, 1987

## Proposal Review Panels Participation

Department of Energy Early Career Award Competition (Early Career Award), 2015

Oak Ridge Associated Universities (ORAU) (International Program Research Review), 2014

Department of Energy Early Career Award Competition (Early Career Award), 2013

Department of Energy Office of Science Graduate Fellowship Program (Graduate Fellowship Program), 2012

Department of Energy Early Career Award Competition (Early Career Award), 2010

GDL Foundation (Program Review Panel chair: Annual reviews), 2005

## Teaching and Advising

### University Courses Taught

Research in Structural Diagenesis (GEO 394): The University of Texas at Austin Department of Geological Sciences, 2012-2019.

Dissertation, GEO 999W: individual instruction, Department of Geological Sciences, The University of Texas at Austin, Austin, Texas, 2009.

Research in Geophysics, GEO 394: individual instruction, Department of Geological Sciences, The University of Texas at Austin, Austin, Texas, 2009.

Thesis, GEO 698A: individual instruction, Department of Geological Sciences, The University of Texas at Austin, Austin, Texas, 2009.

Thesis, GEO 698B: individual instruction, Department of Geological Sciences, The University of Texas at Austin, Austin, Texas, 2009.

Structural diagenesis seminar (informal--graduates and staff met seven times, 2 h each time): The University of Texas at Austin, Department of Geological Sciences, Austin, Texas, October 2005.

New methods for fracture prediction and evaluation: presented to U.T. Reservoir Geology class (Tinker/Fisher), Austin, Texas, November 4, 2003.

Diagenetic processes in fractures: presented to U.T. Structural Geology class (Marrett), Monterrey, Mexico, October 31, 2003.

Microfractures: presented to structural geology class, Department of Geological Sciences, The University of Texas at Austin, Austin, Texas, September 30, 2002.

Fracture porosity evolution: presented to structural geology class, Department of Geological Sciences, The University of Texas at Austin, Austin, Texas, September 27, 2002.

Lecturer, Brittle structure: presented to GEO 381E, Department of Geological Sciences, The University of Texas at Austin, Austin, Texas, 2002.

Three lectures to structural geology classes: presented to Department of Geological Sciences (Geo 228), The University of Texas at Austin, Austin, Texas, April 2001.

Naturally fractured reservoirs: presented three lectures to Petroleum and Geosystems Engineering class (PGE 383), Department of Petroleum and Geosystems Engineering, The University of Texas at Austin, Austin, Texas, September 2000.

Deformation of the Earth: Bureau of Economic Geology research seminar, The University of Texas at Austin, Austin, Texas, July 2000.

Specifying lengths of horizontal wells : Bureau of Economic Geology research seminar, The University of Texas at Austin (with J. Stowell and R. Marrett), Austin, Texas, February 2000.

Integrated study of Mara Este field (with Edgar Guevara, Steve Ruppel): presented at Bureau Seminar Series, Austin, December 1999.

Degradation beyond the emergent threshold: presented at Bureau Seminar Series, Austin, September 1999.

Current research on reservoir fractures: presented to Bureau of Economic Geology, The University of Texas at Austin, February 1998.

Advancements in Sandstone Analysis through Axial Point-Load Testing (with S. J. Clift): November 1992.

Current Views of Fracture Development in Rock: March 1991.

The Uses and Limitations of Borehole-Imaging Logs (with E. H. Guevara): November 1988.

Wellbore Ellipticity in East Texas (with R. W. Baumgardner, Jr.): November 1987.

Subsurface Fracture Analysis: April 1987.

Lecturer, Graduate classes in advanced structural geology and tectonics/geophysics and undergraduate classes in structural geology: Lehigh University, 1986.

Lecturer, Graduate classes in advanced structural geology and tectonics/geophysics and undergraduate classes in structural geology: Lehigh University, 1985.

### Continuing Education Courses Taught

Fractures in reservoirs (various presentations): presented at AAPG Fractured Reservoir School, Austin, Texas, November 10-14, 2004.

Structure and diagenesis of reservoirs in NE Venezuela: presented to Repsol YPF, Houston, Texas, January 26, 2004.

Recent trends in fractured reservoir analysis: presented to Society of Petroleum Engineers, Dongying, China, November 23, 2003.

Fracture opening history reconstructions: presented at Fracture Research and Application Consortium Annual Research Meeting, Jackson, Wyoming, July 21, 2003.

Surrogate analysis and microstructure imaging: presented at Fracture Research and Application Consortium Workshop, Jackson, Wyoming, July 17, 2003.

Fractured reservoir characterization and modeling: Professional school sponsored by American Association of Petroleum Geologists, Austin, Texas, 2001.

Fractured reservoir characterization and modeling: Professional school sponsored by American Association of Petroleum Geologists, Austin, Texas, November 2000.

Fractured reservoir characterization and modeling: American Association of Petroleum Geologists, Austin, Texas, 1999

Fractured reservoir characterization and modeling: Professional school sponsored by American Association of Petroleum Geologists, Austin, Texas, 1999.

Using microstructure observations to quantify natural fracture properties and improve reservoir simulations: EDM/DOE Fractures Project Workshop, Austin, Texas, July 1996

New methods to quantify natural fracture attributes: Geological Society of America Workshop, March 1996

Geometry of Normal Faults and the Structure of Fault Zones: Field Seminar presented to Exxon Production Research, Salome, Arizona, March 1990.

Fractures in Sedimentary Rocks: Gas Research Institute Fracture Workshop, Bureau of Economic Geology, February 1987

## Field Trips Leadership

Leader, Geology of Unconventional Gas: BEG/EM Cooperative Field Trip, Jackson, Wyoming, June 2010.

Leader, Geology of Central Texas: Schlumberger, Austin, Texas, 2001.

Leader, Geology of Central Texas: BP Amoco, Austin, Texas, 1999.

Leader, Quantification of Fractures: North American Council on Geostatistics, Austin, Texas, 1999.

Leader, Evaluating natural fractures in carbonate reservoir development, field seminar: Amoco-Norway, Austin, Texas, June 1998.

Leader, Fractures in Central Texas: Amoco Production Company geophysics group, Austin, Texas, 1996.

Leader, Continental Margins Symposium, Geology of the Balcones Fault Zone, Central Texas: Austin, Texas, 1992.

Leader, Fractures in Frontier Formation: Wyoming Geological Association/American Association of Petroleum Geologists, Casper, Wyoming, 1992.

Leader, Fractures and Subsidiary Faults Associated with Normal Faults of the Balcones Fault Zone: Austin Geological Society, Austin, Texas, 1990.

Leader, Mesozoic Thrusting, Synplutonic Deformation, and Miocene Overprinting, Harcuvar Complex: A Section through the Pre-Tertiary Crust of West-Central Arizona: Geological Society of America, Phoenix, Arizona, 1990.

Leader, Gas Research Institute Natural Gas Supply Project Meeting, Frontier Formation and Grand Teton National Park: Jackson, Wyoming, 1987.

Leader, Mesozoic Thrust Faults, Tertiary Detachment Faults, and Associated Rocks, Fabrics, and Mineralization, Whipple-Buckskin-Harcuvar Area, Western Arizona and Southeastern California: Geological Society of America, Phoenix, Arizona, 1987.

Leader, Tectonic Evolution of the British Isles: Lehigh University, London and Edinburgh, United Kingdom, May 1986.

## Student Committee Supervision

Supervisor, Ph.D. Dissertation Committee, Matt Ramos, The University of Texas at Austin, Department of Geological Sciences, 2019

Supervisor, M.S. Thesis Committee, Abdulaziz Almansour, Energy and Earth Resources program, Jackson School of Geosciences, 2017

Supervisor, M. S. thesis committee, John Li, 2016

Rapporteur, Ph.D jury, Christophe Matonti, Aix-Marseille Université, 2015

Supervisor, M. S. graduate student research, Lauren K. Copley, The University of Texas at Austin Department of Geological Sciences, 2015

Supervisor, M. S. thesis committee, Qiqi Wang, The University of Texas at Austin Department of Geological Sciences, 2015

Supervisor, M. S. thesis committee, Romain Lacube, Aix-Marseille Université, 2015

Examineur, Ph.D jury, Arthur Lavenue, Aix-Marseille Université, 2013

Co-Supervisor, M.S., Thesis, Laura Pommer, The University of Texas at Austin, 2012

Supervisor, Ph.D. Dissertation Committee, Faustino Monroy-Santiago, Prediction of macrofractures from microfracture data in carbonate reservoirs: Sierra Madre Oriental,

Chiapas-Tabasco and Campeche Sound, Mexico: The University of Texas at Austin, Austin, Texas, Department of Geological Sciences, complete, 2012

Supervisor, Ph.D., Dissertation, John Hooker, The University of Texas at Austin, Department of Geological Sciences, 2012

Co-Supervisor, M.S. Thesis Committee, Alex Urquhart, The University of Texas at Austin, Department of Geological Sciences, completed, 2011

Co-Supervisor, M.S. Thesis Committee, Autumn Kaylor, The University of Texas at Austin, Department of Geological Sciences, completed, 2011

Co-Supervisor, M.S. Thesis Committee, Luke Fidler, The University of Texas at Austin, Department of Geological Sciences, completed, 2011

Co-Supervisor, B.S. with Honors Thesis Committee, Frank Morgan, The University of Texas at Austin, Department of Geological Sciences, completed, 2010

Co-Supervisor, Ph.D. Dissertation Committee, Ouyang Xuecheng, The University of Texas at Austin, Department of Geological Sciences, suspended, 2010

Co-Supervisor, Ph.D., Dissertation, Aysen Ozkan, Opening History of Fractures in Sandstone, The University of Texas at Austin, Department of Geological Sciences, 2010

Supervisor, M.S., Thesis, Peter Hargrove, The University of Texas at Austin, Department of Geological Sciences, 2010

Supervisor, M.S. Thesis Committee, Brandon Barber, The University of Texas at Austin, Department of Geological Sciences, Completed, 2009

Supervisor, M.S., Thesis, Juan Inigo, The University of Texas at Austin, Department of Geological Sciences, 2009

Supervisor, M.S., Thesis, Magdalena Ellis, The University of Texas at Austin, Department of Geological Sciences, 2009

Supervisor, M.S. Thesis Committee, Edgar Pinzon, Fracture Pattern Prediction Using Geomechanical Models Incorporating Diagenesis, with Comparison to Outcrop Data, Cambrian Eriboll Sandstones, Northwestern Scotland and Core Observations, Tertiary Mirador Formation Sandstones, Llanos Foothills Colombia: The University of Texas at Austin, Department of Geological Sciences. Completed., 2007

Supervisor, M.S. Thesis Committee, Kira Diaz Tushman, Fracture Tectonics, Fracture Porosity Evolution and

Structural Diagenesis, Cambrian Eriboll Sandstones, Northwest Scotland: The University of Texas at Austin, Department of Geological Sciences, 2006

Supervisor, M.S. Thesis Committee, Meghan E. Ward, Opening History and Porosity Evolution of Fractures in Sandstone, Triassic to Jurassic La Boca Formation, Northeast Mexico: The University of Texas at Austin, Department of Geological Sciences, 2006

Supervisor, M.S., Thesis, Meghan E. Ward, Opening History and Porosity Evolution of Fractures in Sandstone, Triassic to Jurassic La Boca Formation, Northeast Mexico, The University of Texas at Austin, 2006

Co-Supervisor, M.A., Thesis, Chris Wilson, Predicting fracture degradation in the Piceance Basin, Colorado: Can a surrogate measurement guide the way to open fractures and highly productive wells?, The University of Texas at Austin, Petroleum and Geosystems Engineering, EMR Program, 150 p, completed, 2004

### Student Committee Participation

Member, Ph.D. Dissertation Committee, Weiwei Wang, The University of Texas at Austin, Department of Petroleum and Geosystems Engineering, 2015

Member, Dissertation, Ji Li, The University of Texas at Austin, Department of Petroleum and Geosystems Engineering, 2013

Member, M. S. thesis committee, Yaser Alzayer, The University of Texas at Austin, 2013

Member, M.S. Thesis Committee, Rudy Reynolds, The University of Texas at Austin, Engineering, completed, 2012

Member, Ph.D. Dissertation Committee, Gareth Cross, The University of Texas at Austin, Department of Geological Sciences, completed, 2012

Member, Ph.D. Dissertation Committee, Julia Schneider, The University of Texas at Austin, Department of Geological Sciences, completed, 2010

Member, Ph.D. Dissertation Committee, Arash Dahi, The University of Texas at Austin, Department of Petroleum & Geosystems Engineering, Completed 2009, 2009

Member, M.A. Thesis Committee, Natalia Kalitynska, Economic and engineering evaluation of hydraulic fracture completion practices in the Piceance Basin, CO, USA: The University of Texas at Austin., Completed., 2007

Member, M.S. Thesis Committee, Hamid Adefashe, Determining the Fracture Mechanics Properties of Sedimentary Rocks Using Double Torsion Testing: UT Petroleum & Geosystems Engineering, 2006

Member, Ph.D. Dissertation Committee, Namsu Park, Discrete Element Modeling of Rock Fracture Behavior: Fracture Toughness and Time-Dependent Fracture Growth: UT Petroleum & Geosystems Engineering, 2006

Member, Ph.D. Dissertation Committee, Younis Altobi, The University of Texas at Austin, 2006

Member, Thesis Committee, Tim Gibbons, The University of Texas at Austin, Department of Geological Sciences, 2006

Member, Ph.D. Dissertation Committee, Peggy Rijken, The University of Texas at Austin, Department of Petroleum & Geosystems Engineering, 2005

Member, Thesis Committee, Matt Davis, The University of Texas at Austin, Department of Geological Sciences, 2005

Ph.D. Dissertation Committee, Leonel Gomez, The University of Texas at Austin, Austin, Texas, Department of Geological Sciences, in progress, 2005

Member, M.S. Thesis Committee, John Hooker, Fault Timing in the Sierra Madre Oriental, Northeastern Mexico: The University of Texas at Austin, Department of Geological Sciences, 2004

Ph.D. Dissertation Committee, Myeong-Hwan Noh, The University of Texas at Austin, Austin, Texas, Department of Petroleum & Geosystems Engineering, 2004

Ph.D. Dissertation Committee, Orlando Ortega, The University of Texas at Austin, Austin, Texas, Department of Geological Sciences, 2002

Ph.D. Dissertation Committee, Yuan Qiu, The University of Texas at Austin, Austin, Texas, Department of Petroleum and Geosystems Engineering, 2002

Member, M.S., Thesis, Javier G. Moros Otero, Relationship between fracture aperture and length in sedimentary rocks, The University of Texas at Austin, Austin, Texas, Department of Geological Sciences, 1999

Member, Ph.D., Dissertation, Stephen W. Grimes, The Grenville orogeny in West Texas: Structure, kinematics, metamorphism and depositional environment of the Carrizo Mountain Group, The University of Texas at Austin, Austin, Texas, Department of Geological Sciences, 1999

Member, M.S., Thesis, Chris Zahm, Hydrology, The University of Texas at Austin, Austin, Texas, 1998

Member, Ph.D., Dissertation, Stefan S. Boettcher, Crustal shortening, extension, and unroofing in the Dome Rock Mountains, Arizona, The University of Texas at Austin, Austin, Texas, Department of Geological Sciences, 1996

Member, M.S., Thesis, Rebecca C. Smyth-Boulton, Porosity and permeability controls in the Santana ash-flow tuff, Trans-Pecos Texas, The University of Texas at Austin, Austin, Texas, Department of Geological Sciences, 1995

M.S. Thesis Committee, Barbara Smith, Hydrogeology: The University of Texas at Austin, Austin, Texas, 1994

Member, Ph.D., Dissertation, Chris Laughton, Civil Engineering, The University of Texas at Austin, Austin, Texas, completed, 1994

Member, Ph.D., Dissertation, Hwanjo Baek, Evaluation of fracture mechanics properties and microstructural observations of rock fractures, The University of Texas at Austin, Austin, Texas, Department of Civil Engineering, 1994

Member, M.S., Thesis, Barbara A. Marin, Kinematic evolution of a ductile shear zone system, Granite Wash Mountains, West-Central Arizona, The University of Texas at Austin, Austin, Texas, Department of Geological Sciences, 1993

## Presentations

### Invited Presentations

Core Fracture Description of the Hydraulic Fracture Test Site (HFTS1) Slant Core, Reagan Co., Midland Basin, Texas: presented to The University of Texas at Austin, Hildebrand Department of Petroleum and Geosystems Engineering, presented at Graduate Student Seminar Series, September 9, 2019.

Core Fracture Description of the Hydraulic Fracture Test Site (HFTS1) Slant Core, Reagan Co., Midland Basin, Texas: presented to Texas A&M Petroleum Engineering Graduate Student Seminar Series, presented at Texas A&M University, College Station, September 3, 2019.

Fracture corridors and structural diagenesis: presented to Geological Society of London, presented at The Geology of Fractured Reservoirs, London, UK, October 24, 2018.

Predicting fracture porosity evolution: presented to Department of Energy, presented at DOE Basic Energy Sciences Principal Investigators meeting, Gaithersburg, Md., August 7-9, 2018.

Chemical-mechanical feedback and fracture size and spacing patterns: presented to EAGE, presented at 2018 EAGE Annual Conference and Exhibition, Copenhagen, Denmark, June 13, 2018.

Structural geology and geomechanics: presented to SENER Secretaría De Energía - Mexico, presented at National Priorities for Research, Technological Development and Human Resources Training, to optimize the Mexican production portfolio, Mexico City, April 11, 2018.

Evolving fracture systems: field-based observations with implications for machine learning strategies: presented to DOE Basic Energy Sciences workshop, presented at Information Is in the Noise: Signatures of Evolving Fracture Systems. The Machine Learning/Deep Learning Challenge, Gaithersburg, Md., March 28, 2018.

Fractures: a brief overview--Mechanical discontinuities from faults to microfractures: presented to DOE Basic Energy Sciences workshop, presented at Information Is in the Noise: Signatures of Evolving Fracture Systems, The Machine Learning/Deep Learning Challenge, Gaithersburg, Md., March 28, 2018.

Structural diagenesis of fracture systems: presented to EAGE (keynote address), presented at

Third EAGE Workshop on Naturally Fractured Reservoirs, Muscat, Oman, February 6, 2018.

Structural diagenesis of faults in sandstone: presented to 2017 GSA Fall Meeting session: Spatiotemporal variations and the role of fluids in fault-zone hydromechanical properties, presented at Geological Society of America Abstracts with Programs, v. 49, no. 6, doi:10.1130/abs/2017AM-296599, Seattle, Wash., October 22, 2017.

Lander, R. H., and Laubach, S. E., Interaction of fracture development and quartz cementation: presented to Diagenesis Research Group meeting, presented at AAPG Annual Convention, Houston, Tex., April 3, 2017.

Reconstructing fracture opening histories and timing using structural diagenesis: presented to Oxford University, Oxford, UK, December 2, 2016.

Chemical-mechanical interaction in formation of fracture size patterns: presented at Basic Energy Sciences Principal Investigators workshop, Gaithersburg, Md., August 15, 2016.

Fracture mechanics and fracture pattern evolution near faults in reactive environments: presented to Tarim Oil Field Company, Korla, China, May 27, 2016.

Evidence for feedback in fracture pattern development: presented to Basic Energy Sciences panel on fracture geomechanics and fracture growth, Department of Energy workshop, Leesburg, VA, May 10, 2016.

Fracture mechanics and fracture pattern evolution in deep, hydrothermal and reactive environments: presented to Basic Energy Sciences panel on fracture geomechanics and fracture growth, Department of Energy workshop, Leesburg, VA, May 10, 2016.

Predicting subsurface natural fractures and their effects on reservoir behavior: presented to Department of Petroleum Engineering, Texas A&M University, Graduate Seminar Series, College Station, Texas, April 4, 2016.

The role of diagenesis in modulating fracture size: presented to Aix-Marseille Université, Marseille, France, October 1, 2015.

The role of structural diagenesis in faulting and fracturing of upper crustal rocks: presented to European Geophysical Union General Assembly, invited session keynote, presented at Vienna, Austria, April 14, 2015.

Effects of concurrent cement precipitation on fracture growth: predicting fracture size: presented to University of Minnesota Department of Earth Sciences, Minneapolis, Minnesota, April 3, 2014.

## Presentations

Fracture Description of the HFTS-2 Slant Core, Delaware Basin, West Texas: presented at URTeC, Houston, Tex., July 2021.

How rocks fracture: current research strands: presented to University of Texas at Austin structural geology classes (GEO 428 and GEO 380C), December 5, 2018.

Progress in fracture analysis: presented to Fracture Research and Application Consortium annual meeting, Casper, Wyo., September 17, 2018.

Predicting size and why it matters: A structural diagenesis approach to fracture prediction: invited talk presented to Rocky Mountain Section-SEPM, Denver, Colorado, October 2013.

The geology of natural fractures: invited lead-off talk: SEG Post-convention Workshop: "Are we able to detect and characterize fractures?", September 2013.

Elected Editor's report on AAPG Publications: annual presentation to AAPG House of Delegates, Pittsburgh, Pennsylvania, 2013.

New technical division proposal: petroleum structure and geomechanics division: presented at House of Delegates Midyear Meeting, Boulder, Colorado, December 2012.



Diagenetic controls on fracture size distributions: presented at 2012 GSA Annual Meeting & Exposition, Charlotte, North Carolina, November 7, 2012.

On the organizational structure of AAPG: presented to the Advisory Council, AAPG Leadership Conference, Tulsa, Oklahoma, August 2012.

The Association role in fostering scientific breakthrough: presented at AAPG Leadership Conference, Tulsa, Oklahoma, August 2012.

Structural diagenesis, resource plays, the Highlands of Scotland, and curriculum development: AAPG Distinguished Lecture presented to Tulsa Geological Society, Tulsa, Oklahoma, May 1, 2012.

Structural diagenesis, resource plays, the Highlands of Scotland, and curriculum development: AAPG Distinguished Lecture presented to Department of Geological Sciences, University of Saskatchewan, Saskatoon, Canada, April 12, 2012.

Structural diagenesis, resource plays, the Highlands of Scotland, and curriculum development: AAPG Distinguished Lecture presented to Montana Geological Society, Billings, Montana, April 11, 2012.

Structural diagenesis, resource plays, the Highlands of Scotland, and curriculum development: AAPG Distinguished Lecture presented to Canadian Society of Petroleum Geologists, Calgary, Canada, April 10, 2012.

Structural diagenesis, resource plays, the Highlands of Scotland, and curriculum development: AAPG Distinguished Lecture presented to Utah Geological Association, Salt Lake City, Utah, April 9, 2012.

Structural diagenesis, resource plays, the Highlands of Scotland, and curriculum development: AAPG Distinguished Lecture presented to Department of Geological Sciences, Texas A&M University, College Station, Texas, April 3, 2012.

Elected Editor's report on AAPG Publications: annual presentation to AAPG House of Delegates, Long Beach, California, 2012.

Structural diagenesis, resource plays, the Highlands of Scotland, and curriculum development: AAPG Distinguished Lecture presented to Department of Geological Sciences, Michigan State University, East Lansing, Michigan, September 23, 2011.

Structural diagenesis, resource plays, the Highlands of Scotland, and curriculum development: AAPG Distinguished Lecture presented to Department of Geology, Southern Illinois University, Carbondale, Illinois, September 21, 2011.

Structural diagenesis, resource plays, the Highlands of Scotland, and curriculum development: AAPG Distinguished Lecture presented to Department of Geological Sciences, University of Missouri, Columbia, Missouri, September 20, 2011.

Structural diagenesis, resource plays, the Highlands of Scotland, and curriculum development: AAPG Distinguished Lecture presented to Department of Geology and Geophysics, Louisiana State University, Baton Rouge, Louisiana, September 19, 2011.

Structural diagenesis, resource plays, the Highlands of Scotland, and curriculum development: AAPG Distinguished Lecture presented to Department of Geology, Tufts University, Medford, Massachusetts, September 16, 2011.

Structural diagenesis, resource plays, the Highlands of Scotland, and curriculum development: AAPG Distinguished Lecture presented to Department of Geosciences, University of Massachusetts, Amherst, Massachusetts, September 15, 2011.

Degradation and stimulation for unconventional: presented to Reservoir Deformation Research Group, Structural Geology and its Role in Describing and Optimizing Production from Unconventional Petroleum Systems, Houston, Texas, 2011 - 2011

Elected Editor's report on AAPG Publications: annual presentation to AAPG House of Delegates, Houston, Texas, 2011.

Diagenesis, structure, and producibility in unconventional gas plays: presented at Illinois Geological Survey, Champagne, Illinois, January 2010.

Fracture diagenesis and producibility in tight gas sandstones: presented at Illinois Geological Survey seminar, Urbana, Illinois, January 2010.

Structural diagenesis: Kirkpatrick lecture: presented at Department of Geology colloquium, University of Illinois, Urbana, Illinois, January 2010.

The geology of unconventional gas plays: presented at Illinois Oil and Gas Association, Mt. Vernon, Illinois, January 2010.

Formation and accumulation of unconventional petroleum accumulations in the context of fluid history and fracture analysis: invited keynote address presented at Fifth International symposium on Formation and Accumulation Mechanisms of Petroleum and Evaluation of Petroleum Resources, China State Key Laboratory of Petroleum Resource and Prospecting, Beijing, China, October 2009.

How fractures in sedimentary rocks open and seal: Insights from structural diagenesis: presented at the ConocoPhillips colloquium, Houston, Texas, May 2009.

Fractures in the New Albany Shale: implications for development of effective drilling and completion technologies: presented at the RPSEA Unconventional Gas Review Meeting, Denver, Colorado, April 2009.

How fractures open and stay that way: Lessons from structural diagenesis: presented at Department of Earth & Planetary Sciences colloquium, University of New Mexico, Albuquerque, New Mexico, February 2009.

Modeling natural fractures: presented to Shell Canada, Calgary, Alberta, December 2008.

Fracture pattern prediction using geomechanical models incorporating diagenesis, with comparison to outcrop data (Cambrian Eriboll Group sandstones, Northwestern Scotland): presented at Joint Annual Meeting, Geological Society of America, GCAGS, Houston, Texas, October 5-9 2008.

Structural diagenesis: an integrated investigative approach to coupled chemical and mechanical processes in sedimentary systems: presented at Joint Annual Meeting, Geological Society of America, GCAGS, Houston, Texas, October 5-9 2008.

Structural diagenesis: fracture opening and sealing processes: presented at the International Geological Congress, Oslo, Norway, August 2008.

Current state of the art in reservoir fracture mechanics with emphasis on roles of fluid flow and chemistry: presented at the ExxonMobil Research, Annandale, New Jersey, July 2008.

Open fractures, diagenesis and in situ stress: presented at the AAPG Hedberg Research Conference, Casper, Wyoming, July 2008.

Using diagenesis information to measure fracture timing: presented to Consortium for Quantitative Prediction of Sandstone Reservoir Quality, Lost Pines, Texas  
Texas, June 2, 2008.

Structural diagenesis: the integration of structural geology and diagenesis: presented at the AAPG Annual Convention, San Antonio, Texas, April 2008.

Diagenetic controls on fracture size scaling and fracture porosity evolution, Cambrian Eriboll Group Sandstone, NW Scotland: Implications for distributed brittle deformation and fluid flow in the continental lithosphere: presented at Geological Society of London Arthur Holmes Meeting, Ullapool, Scotland, May 2007.

Fracture processes and fracture history, Cambrian Eriboll Sandstone: presented at Geological Society of London Arthur Holmes Meeting, Ullapool, Scotland, May 2007.

Structural diagenesis symposium: leader, , Scotland, May 2007.

Structural complexity in structurally simple fractured reservoir analogs: presented at AAPG Convention, Long Beach, California, April 2007.

Insights into reservoirs from structural diagenesis: presented to Ft. Smith Geological Society, Ft. Smith, Arkansas, February 13, 2007.

New approaches to structural complexity in structurally simple fractured reservoirs and reservoir analogs: presented to Fort Smith Geological Society, Fort Smith, Arkansas, February 13, 2007.

Verifiable predictions of fractured reservoir attributes: presented at American Association of Petroleum Geologists International Conference and Exhibition, Perth, Australia, November 2006.

Three presentations on research progress and status: presented at Fracture Research and Application Consortium Annual Meeting, Austin, Texas  
Texas, October 2006.

Insights into reservoir heterogeneity from fracture and structural diagenesis research: presented to Petrobras, Rio de Janeiro, Brazil, July 12, 2006.

Insights into reservoirs from structural diagenesis: presented to Petrobras, Rio de Janeiro, Brazil, July 2006.

What are the most important types of geological data that need to be quantified to best constrain the fabrics of reservoir rocks and fracture systems for 4D reservoir modeling and production?: invited talk presented to AAPG Reservoir Deformation Group (also served as panelist), Houston, Texas, April 11, 2006.

Scales of heterogeneity in fractured reservoirs: presented to Geological Society of London, London, England, March 2006.

Fractured sandstone outcrops in northeast Mexico: guides to the attributes of fractures in tight gas sandstones: presented at American Association of Petroleum Geologists, Rocky Mountain Section, Jackson, Wyoming, September 2005.

Linked diagenesis and fracture patterns and their effect on fluid flow in fractured carbonate rocks: presented at American Association of Petroleum Geologists Convention, Paris, France, September 2005.

Regional subthrust fracture arrays in outcrop: guide to attributes of tight gas sandstones: presented at American Association of Petroleum Geologists, Rocky Mountain Section, Jackson, Wyoming, September 2005.

Structural diagenesis--linked chemical and mechanical processes in sedimentary basins: invited lecture presented at American Association of Petroleum Geologists Convention, Paris, France, September 2005.

Fractures in reservoirs: prediction, characterization, and incorporation in fluid-flow simulations: SPE Distinguished Lecture: presented to Society of Petroleum Engineers, Ho Chi Minh City, Vietnam, November 17, 2004.

Fractures in reservoirs: prediction, characterization, and incorporation in fluid-flow simulations: SPE Distinguished Lecture: presented to Society of Petroleum Engineers, Bartlesville, Oklahoma, October 16, 2004.

Fractures in reservoirs: prediction, characterization, and incorporation in fluid-flow simulations: SPE Distinguished Lecture: presented to Society of Petroleum Engineers, Duncan, Oklahoma, October 15, 2004.

Fractures in reservoirs: prediction, characterization, and incorporation in fluid-flow simulation: SPE Distinguished Lecture: presented to Society of Petroleum Engineers, Austin, Texas, February 24, 2004.

(with L. Gomez, J. Gale, and R. Marrett) Fracture intensity and fracture cementation: an example from a horizontal core in the Piceance Basin: poster presented at AAPG Hedberg Conference, Austin, Texas, February 9, 2004.

(with S. Dutton and B. Marin) Progressive diagenesis, evolving mechanical stratigraphy, and fracture patterns in Canyon Sandstone: poster presented at AAPG Hedberg Conference, Austin, Texas, February 9, 2004.

Interdisciplinary studies in sedimentary basins: presented at AAPG Hedberg Research Conference (invited keynote address), Austin, Texas, February 9, 2004.

Fractures in reservoirs: prediction, characterization, and incorporation in fluid-flow simulations: SPE Distinguished Lecture: presented to Society of Petroleum Engineers, Villahermosa, Mexico, January 9, 2004.

Fractures in reservoirs: prediction, characterization, and incorporation in fluid-flow simulations: SPE Distinguished Lecture: presented to Society of Petroleum Engineers, Farmington, New Mexico, January 8, 2004.

Fractures in reservoirs: prediction, characterization, and incorporation in fluid-flow simulations: SPE Distinguished Lecture: presented to Society of Petroleum Engineers, Dongying, China, November 24, 2003.

Fractures in reservoirs: prediction, characterization, and incorporation in fluid-flow simulations: SPE Distinguished Lecture: presented to Society of Petroleum Engineers, Seoul, Republic of South Korea, November 20, 2003.

Fractures in reservoirs: prediction, characterization, and incorporation in fluid-flow simulations: SPE Distinguished Lecture: presented to Society of Petroleum Engineers, Tokyo, Japan, November 19, 2003.

Fractures in reservoirs: prediction, characterization, and incorporation in fluid-flow simulations: SPE Distinguished Lecture: presented to Society of Petroleum Engineers, Manila, The Philippines, November 18, 2003.

Advanced technology for predicting the fluid flow attributes of naturally fractured reservoirs from quantitative geologic data and modeling: presented to Department of Energy, Tulsa, Oklahoma, August 19, 2003.

Fracture characterization (invited keynote lecture): presented at Université de Liège, Liège, Belgium, June 10, 2003.

Fractures in reservoirs: prediction, characterization, and incorporation in fluid-flow simulations: presented to Society of Petroleum Engineers Distinguished Lecture Committee, Houston, Texas, May 8, 2003.

Future research opportunities for structural geologists in the petroleum industry: presented at Student Seminar, Department of Geology, University of Idaho, Moscow, Idaho, January 23, 2003.

Linked mechanical and chemical processes in the development of fracture patterns: presented at Departmental Speaker Series, Department of Geology, University of Idaho, Moscow, Idaho, January 23, 2003.

New fracture characterization methods: presented to Shell E & P, Houston, Texas, September 18, 2002.

Calibrating seismic using new fracture characterization methods: presented to Williams E & P, Denver, Colorado, August 19, 2002.

UT fracture research in the Rockies: presented to EOG Resources, Denver, Colorado, August 19, 2002.

Fractures in Frontier Formation: presented at Fracture Research and Application Consortium, Applications Meeting, Jackson, Wyoming, June 22, 2002.

Fundamentals and application of fracture quality methods: presented at Fracture Research and Application Consortium Applications Meeting, Jackson, Wyoming, June 22, 2002.

Research progress on fracture porosity prediction: presented at Fracture Research and Application Consortium Research Meeting, Monterrey, Mexico, February 25, 2002.

Insights from structural diagenesis for structural analysis: presented to Northern Illinois University, DeKalb, Illinois, November 2001.

Recent developments in the domestic U.S petroleum industry: a research organization perspective: presented to Northern Illinois University, DeKalb, Illinois, November 2001.

Structural diagenesis: implications for tectonic interpretation of distal structures: presented to Institute of Geophysics, The University of Texas at Austin, Austin, Texas, November 2001.

Drilling and stimulation strategy: are open fractures aligned with maximum horizontal stress?: presented at Rocky Mountain Association of Geologists Symposium, Denver, Colorado, October 2001.

Identifying open fractures in Rocky Mountain reservoirs: presented at Rocky Mountain Association of Geologists Symposium, Denver, Colorado, October 2001.

Using surrogates for fracture analysis: presented to Rocky Mountain Association of Geologists, luncheon talk, Denver, Colorado, July 2001.

Approaches to fracture characterization: Workshop: Petroleum Technology Transfer Council, San Antonio, Texas, April 2001.

Producibility in tight gas reservoirs: why should you care about fracture quality scaling, major controls on fracture quality: Workshop: Petroleum Technology Transfer Council, San Antonio, Texas, April 2001.

Review of natural Fracture Research: Workshop: Petroleum Technology Transfer Council, Jackson, Mississippi, April 2001.

Fracture quality map of East Texas: Workshop: Fracture Research and Application Consortium Meeting, Austin, Texas, February 2001.

Innovations in fracture characterization and modeling of clastic and carbonate reservoirs: presented to Petroleum Technology Transfer Council, Midland, Texas, February 2001.

Summary of fracture attributes in dolomite: presented to geological staff, Pemex, Ciudad del Carmen, Mexico, January 2001.

Three lectures in Petroleum & Geosystems Engineering (CPE): presented to P&GSE, Austin September 2000.

Case studies in application of new fracture characterization methods: Workshop: Fracture Research and Applications Industrial Associates Applications meeting, Austin, Texas, May 2000.

Focus on fault seal: presented to American Association of Petroleum Geologists, Reservoir Deformation Research Group, New Orleans, Louisiana, April 2000.

Fracture analysis with applications to Oklahoma reservoir: presented to Tulsa Geological Society, Tulsa, Oklahoma, April 2000.

Innovations in fracture characterization and modeling of clastic and carbonate reservoirs: presented at PTTC's Reservoir Characterization Technologies for the Next Millennium: Virtual

Reality, Multicomponent Seismic, Fracture Modeling, and Borehole Imaging , Midland, Texas, February 2000.

Horizontal cores: presented to Fracture Research and Application Consortium, Austin, December 1999.

Degradation and the emergent threshold: a review of new fracture characterization methods for mature fields: presented to SIPES monthly luncheon meeting, Austin, November 1999.

Case study of fracture scaling: presented to International Conference, AAPG and AMGP, Vera Cruz, October 1999.

Fracture characterization: presented to International Conference, AAPG and AMGP, Vera Cruz, October 1999.

Identification of controls on fracture permeability in carbonate reservoirs: presented to Pemex, 2nd Cantarell Conference, Mexico City, October 1999.

Defining new plays in western Venezuela: presented to PDVSA, Austin, September 1999.

Integrated case studies and progress on fundamental understanding of fracture closure: presented at Fracture Research and Application Consortium Annual Meeting, Austin, September 1999.

Review of fracture characterization and modeling methods: presented to Enron, Austin, August 1999.

Fractured reservoirs: presented to Marathon, Littleton, Colorado, January 1999.

Rapid prediction of fracture fluid flow: presented to U.S. Department of Energy workshop, Geologic studies of fractures in reservoirs, Austin, August 1998.

Identifying productive fairways in structured reservoirs: presented to Conoco, Inc., Midland, July 1998.

Analytical laboratory instruments in modern petroleum industry research: presented to Edge Scientific Instruments, Santa Monica, California, June 1998.

Reservoir evaluation: presented to Sanchez Oil & Gas, Austin, June 1998.

The challenges of reservoir structural analysis in the 21st Century: presented to AAPG Reservoir Deformation Research Group annual meeting, Salt Lake City, May 1998.

Web-based professional group information exchange: presented to AAPG Research Committee and AAPG Reservoir Deformation Research Group meeting, Salt Lake City, Utah, May 1998.

Origin of subsurface fractures: Invited keynote speaker, The Woodworth Conference of the Geological Society of London, marking 100 years in the evolution of fracture analysis, Coleraine, Northern Ireland, April 1998.

Strategies for reservoir simulation: presented to YPF/Maxus Energy Corporation, Dallas, Texas, March 1998.

Revolution in fractured core analysis: implications for the petroleum engineer: presented to Departmental Seminar, Petroleum and Geosystems Engineering, The University of Texas at Austin, Austin, Texas, February 1998.

Revolution in fractured core analysis: implications for the petroleum engineer: presented to Departmental Seminar, Petroleum and Geosystems Engineering, The University of Texas at Austin, Austin, Texas, February 1998.

Research on structural geology and reservoir engineering: briefing presented to the Chairman, The University of Texas Board of Regents, Austin, Texas, January 1998.

Strategies for reservoir structural analysis: lecture presented to PDVSA (Maraven), Caracas,

Venezuela, January 1998.

The new paradigm in core analysis: presented to Department of Geology, New Mexico Tech University, Socorro, New Mexico, January 1998.

Structural geology in support of reservoir engineering in modern reservoir management: presented to PGSE 391 graduate class in reservoir engineering, Department of Petroleum and Geosystems Engineering, The University of Texas at Austin, November 1997.

Métodos revolucionarios de análisis de muestras de testigos para yacimientos fracturados: keynote address presentado para la celebración del 32do aniversario de la fundación del Instituto Mexicano del Petróleo, Mexico City, Mexico, October, October 1997.

Diagenetic controls on fracture permeability: presented to 36th U.S. Rock Mechanics Symposium, Columbia University, New York, July 1997.

Fracture properties from rock microstructure: presented to AAPG Hedberg Research Conference, Bryce, Utah, June 1997.

Structure of the new AAPG Reservoir Deformation Research Group: presented to AAPG Hedberg Research Conference, Bryce, Utah, June 1997.

Using core analysis to characterize fractures and calibrate seismic data: presented to GRI technical advisory group, Denver, Colorado, June 1997.

Current progress in fracture evaluation: presented to New Methods of Fracture Characterization and Simulation workshop, Austin, Texas, May 1997.

Fracture orientation and fracture quality prediction case studies: lessons for practical application: presented to New Methods of Fracture Characterization and Simulation workshop, Austin, Texas, May 1997.

Diagenesis from a different perspective: Presented to SEPM Clastic Diagenesis Group discussion meeting, Dallas, Texas, April 1997.

Uncovering fractures: keynote address presented to Imaging Systems dinner, AAPG convention, Dallas, Texas, April 1997.

Recent breakthroughs in analysis of natural fractures: presented to Department of Geology, Tulsa University, Tulsa, Oklahoma, February 1997.

Fracture analysis methods and applications and Application of new structural petrology methods to Chevron's Wolfcamp sandstone core, Pakenham field: presented to Chevron, Midland, Texas, January 1997.

Quantification and prediction of reservoir fracture attributes: presented to PEMEX, Tampico, Mexico, January 1997.

Future of outcrop-based studies of natural fractures and Advanced subsurface fracture and stress characterization methods: presented to Mobil Corp. strategy meeting for fracture and stress research, Dallas, Texas, August 1996.

Using petrology to unlock gas resources in West Texas: presented to Chevron, Houston, Texas, August 1996.

Field and core seminar on fracture systems in carbonate rocks: presented to Amoco Production Research, Austin, Texas, July 1996.

Overview of reservoir simulation project, Summary of fractured reservoir analyses completed to date, New fracture characterization methods, Inferring fracture conductivity from sidewall core samples: presented to industry workshop, Austin, Texas, July 1996.

Geochemical controls on the evolution of porosity and implications of new microstructural observations for the kinetics of crack growth at subcritical tensile stresses: presented to Exxon

Production Research, Houston, Texas, June 1996.

New fracture characterization methods for siliciclastic rocks: presented to North American Rock Mechanics Symposium, Montreal, Canada, June 1996.

Synthesis of petrologic and structural approaches for solving reservoir characterization challenges: presented to Union Pacific Resources, Fort Worth, Texas, May 1996.

Investigations of fractured reservoirs: presented to Enron Oil & Gas, Austin, Texas, March 1996.

New fracture characterization methods and Practical application of new methods: presented to fracture workshop sponsored by Bureau of Economic Geology, Gas Research Institute and Geological Society of America, Austin, Texas, March 1996.

Natural fracture detection using cathodoluminescence: Gas Research Institute Geology Technical Advisory Group meeting, Austin, Texas, November 1995.

Using diagenesis information to improve interpretation of natural fractures: The University of Texas at Austin Department of Geological Sciences seminar, Austin, Texas, November 1995.

Gas research program overview: lecture to Siberian oil and gas managers' training program, Austin, Texas, September 1995.

Improved resource characterization technology: presented at Gas Research Institute Project Advisors Group meeting, Grand Junction, Colorado, July 1995.

Fracture and diagenesis analyses applicable to Canyon Sandstone: presented at Canyon working group meeting, Midland, Texas, June 1995.

Introduction and concept for new fracture analysis approach; Using a new classification of diagenesis to predict fracture conductivity: presented at Fracture Quantification working group meeting, Fort Worth, Texas, May 1995.

Introduction to new research project in Wilcox Lobo play: presented at Wilcox Lobo working group meeting, Houston, Texas, May 1995.

Analyses of slopes in jointed weak rock masses using distinct element method: talk given at Second International Conference on Mechanics of Jointed and Faulted Rock, Vienna, Austria, April 1995.

Differential compaction of interbedded sandstone and coal: presented at international symposium on Forced (Drape) Folds and Associated Fractures, London, England, April 1995.

Fault and joint swarms in a normal fault zone: presented at Second International Conference on Mechanics of Jointed and Faulted Rock, Vienna, Austria, April 1995.

Bureau of Economic Geology research in low-permeability gas reservoirs: presented to research evaluation visiting committee, Austin, Texas, January 1995.

Fracture, fault, and stress research, Wilcox Lobo natural gas trend, South Texas: presented to Industry Operator Workshop, Houston, Texas, September 1994.

Microfractures, macrofractures, and diagenesis: presented to Workshop 2, North American Rock Mechanics Symposium, Austin, Texas, May 1994.

Introduction to geology and production characteristics of Canyon Sandstone: presented at Seminar on Geology of a Stratigraphically Complex Natural Gas Play, Canyon Sandstone, Val Verde Basin, Texas, Midland, Texas, April 1994.

Ozona Canyon sandstone natural fractures and rock properties: presented at Seminar on Geology of a Stratigraphically Complex Natural Gas Play, Canyon Sandstone, Val Verde Basin, Texas, Midland, Texas, April 1994.

Regional tectonic, stratigraphic, and hydrodynamic framework of the Val Verde Basin: presented at Seminar on Geology of a Stratigraphically Complex Natural Gas Play, Canyon Sandstone,



Val Verde Basin, Texas, Midland, Texas, April 1994.

Review and analysis of operator survey results and future challenges to development: presented at Seminar on Geology of a Stratigraphically Complex Natural Gas Play, Canyon Sandstone, Val Verde Basin, Texas, Midland, Texas, April 1994.

Sonora Canyon natural fractures and fracture toughness studies: presented at Seminar on Geology of a Stratigraphically Complex Natural Gas Play, Canyon Sandstone, Val Verde Basin, Texas, Midland, Texas, April 1994.

Complex natural gas reservoirs: presented to Gas Research Institute Project Advisors Group meeting, Golden, Colorado, March 1994.

Is cleat-domain overlap real?: presented to Geology of Open-Hole Cavity Completions Workshop, Austin, Texas, September 1993.

Introduction to the North American Rock Mechanics Symposium: presented to 34th U.S. Symposium on Rock Mechanics, Madison, Wisconsin, June 1993.

Lessons and implications of a new report on tight gas sandstones: presented to GRI Project Advisors Group meeting, Oklahoma City, Oklahoma, May 1993.

Current issues in structural research in the petroleum industry: presented to ARCO Exploration & Production Technology, Plano, Texas, April 1993.

Fracture patterns in Cretaceous sandstones of the western United States--are they representative of those in reservoirs?: presented to ARCO Exploration & Production Technology, Plano, Texas, April 1993.

Natural fractures in Cretaceous sandstones of the western United States: profiting from a widespread reservoir element: presented to GRI/DOE Greater Green River Basin Natural Gas Technology Workshop, Denver, Colorado, April 1993.

Natural fractures in Sonora Canyon sandstones, Sonora and Sawyer fields, Sutton County, Texas: presented to 1993 Society of Petroleum Engineers Rocky Mountain Regional and Low-Permeability Reservoir Symposium, Denver, Colorado, April 1993.

Summary of issues pertaining to detection and characterization of fractures in the subsurface: presented to GRI/BEG Natural Fracture Workshop, Austin, Texas, March 1993.

Natural fractures: profiting from a widespread reservoir element: presented to GRI/DOE Greater Green River Basin Natural Gas Technology workshop, Denver, Colorado, November 1992.

Unraveling the relationship between fracturing and diagenesis: presented to Lawrence Berkeley National Laboratories, Berkeley, California, November 1992.

Problems associated with interpretation of fracture patterns in coal and Future research directions in structural analysis of fractures: presented to GRI Fracture Research workshop, Austin, Texas, June 1992.

Frontier Formation stratigraphy, diagenesis and natural fractures: presented to Gas Research Institute/Society of Petroleum Engineers workshop Conclusions of Research in the Frontier Formation: Casper, Wyoming, May 1992.

Regional state of stress and hydraulic fracture azimuth in the western Green River Basin: presented to Gas Research Institute/Society of Petroleum Engineers workshop Conclusions of Research in the Frontier Formation: Casper, Wyoming, May 1992.

Summary of BEG geologic studies of Canyon Sandstone, Texas, and Frontier Formation, Wyoming: presented to Gas Research Institute Project Advisors Group meeting, Albuquerque, New Mexico, May 1992.

Fracture patterns in reservoir rocks: presented to Fort Worth Geological Society, Fort Worth, Texas, January 1992.

Geological Aspects of Fractured Reservoir Characterization: presented to Forum on Improved Oil and Gas Recovery (speaker and work session technical coordinator), San Antonio and Longview, Texas, November 1991.

Observations of Subsurface Fractures and Implications for Interpreting Seismic and Borehole Acoustic Data: presented to Society of Exploration Geophysics Workshop, Houston, Texas, November 1991.

Approaches to Predicting Regional Fractures: presented to Houston Geological Society, Short Course-Identifying and Interpreting Fractures, Houston, Texas, October 1991.

Regional Coal Fracture Patterns: presented at 32nd U.S. Symposium on Rock Mechanics, Rock Mechanics as a Multidisciplinary Science, The University of Oklahoma, Norman, Oklahoma, July 1991.

Pitfalls of Fracture Identification and Characterization with Borehole Imaging Logging Systems: presented to Houston Westside Society of Professional Well Log Analysts luncheon meeting, Houston, Texas, February 1991.

Tectonics, Fractures, and Implications for Horizontal Drilling in the Western United States: presented to Department of Geology, The University of Texas at El Paso, El Paso, Texas, October 1990.

Natural Fractures in Gas Reservoirs: briefing presented to Gas Research Institute, Austin, Texas, July 1990.

Analysis of In Situ Stress and Fractures in Reservoir Rocks: two lectures presented to graduate class in reservoir analysis (Geology 391), Department of Geological Sciences, The University of Texas at Austin, Austin, Texas, April 1990.

Insights Into Fault Geometry: Field and Laboratory Studies: presented at Applied Geodynamics Laboratory Board of Advisors Meeting, Austin, Texas, November 1989.

Aspects of Geological and Geophysical Evaluation of Subsurface Fractures: presented at Norsk Hydro a.s., Bergen, Norway, October 1989.

Patterns in the Development of Extensional Fault Block Shape from Comparison of Outcrop-Scale Faults and Physical Models: presented at Norsk Hydro a.s., Bergen, Norway, October 1989.

Application of Borehole-Imaging Logs to Fracture Evaluation in Low-Permeability Gas Reservoirs: invited presentation at SPE Fractured Reservoir Forum, Crested Butte, Colorado, July 1989.

Origin, Distribution, and Effect on Production of Natural Fractures in a Low-Permeability Gas Reservoir with Extensive Quartz Cement: presented at SPE Fractured Reservoir Forum, Crested Butte, Colorado, July 1989.

Current Research on Prediction of Fractures: presented at Exxon Production Research, Houston, Texas, June 1989.

Geometry of Normal Faults in Layered Rocks: Examples from the Basin and Range Province: presented at Exxon Production Research, Houston, Texas, June 1989.

Stratigraphy, Diagenesis, and Structure of the Travis Peak Formation and Their Effects on Reservoir Quality: presented at Techniques of Comprehensive Evaluation and Completion of Tight Gas Sand Reservoirs: presented to Gas Research Institute Forum/Workshop in association with the Society of Petroleum Engineers Gas Technology Symposium, Dallas, Texas, June 1989.

Analysis of Fractures and In Situ Stress in Reservoir Rocks: two lectures presented to graduate class in reservoir analysis (Geology 391), Department of Geological Sciences, The University of Texas at Austin, Austin, Texas, April 1989.

Coring-Induced Fractures: Indicators of Hydraulic Fracture Propagation Direction in a Naturally Fractured Reservoir: presented at 1988 Society of Petroleum Engineers Annual Technical Conference, Houston, Texas, October 1988.

Cretaceous and Tertiary Compressional Tectonics as the Cause of the Sabine Arch, East Texas and Northwest Louisiana: presented at the Gulf Coast Association of Geological Societies 1988 Annual Meeting, New Orleans, Louisiana, October 1988.

Significance of Natural and Coring-Induced Fractures in the Travis Peak Formation for Reservoir Stimulation: presented at the Gulf Coast Association of Geological Societies 1988 Annual Meeting, New Orleans, Louisiana, October 1988.

Fracture Detection in Low-Permeability Reservoir Sandstone: A Comparison of BHTV and FMS Logs to Core: presented at the 1988 Society of Petroleum Engineers Annual Technical Conference, Houston, Texas, August 1988.

Geological Overview of Staged Field Experiment No. 2: presented at Forum on the Relationship Between Rock Mechanical Properties and Acoustic Well Log Data, Lakeway, Texas, May 1988.

Kinematics and Structural Style of Thrust Faults in Western Arizona: presented at the Workshop on the California-Arizona Crustal Transect, sponsored by the U.S. Geological Survey, Flagstaff, Arizona, May 1988.

Stress Measurement and Fracture Detection in the Travis Peak Formation: presented at Schlumberger-Doll Research Center, Ridgefield, Connecticut, May 1988.

Fractured Reservoirs: lectures presented to graduate class in reservoir analysis, Department of Geological Sciences, The University of Texas at Austin, Austin, Texas, March 1988.

Natural Fracture History of the Travis Peak Formation: presented to the Center for Tectonophysics, Texas A&M University, College Station, Texas, February 1988.

Structural Geology of the Travis Peak Formation: presented at the Gas Research Institute Forum on the 1986 Staged Field Experiment No. 1, Lake Conroe, Texas, September 1987.

Stress Measurement and Fracture Analysis in East Texas: presented at GRI Project Advisors Group meeting, Las Vegas, Nevada, February 1987.

Polyphase Deformation and Thrust-Induced Strain, Maria Foldbelt, Western Arizona: presented to University of Illinois, Geology Department colloquium, Urbana, Illinois, May 1986.

Shear Heating and Fault Dynamics: presented to Lehigh University, Geology Department colloquium, Bethlehem, Pennsylvania, February 1986.

## Activities of a Professional Nature

### Professional Societies

American Association of Petroleum Geologists

American Geophysical Union

American Rock Mechanics Association

Council on Undergraduate Research

Geological Society of America

Geological Society of London

International Society for Rock Mechanics

Rocky Mountain Association of Geologists

Society of Petroleum Engineers

### Major Field Campaigns

Tarim Basin fieldwork, fractured carbonate rocks, western China, Spring 2016

## Program and Project Management

Founder and Principal Investigator, Fracture Research and Application Consortium, 1998-present

Principal Investigator, Fracture Opening Processes, Chemical Sciences, Geosciences and Biosciences Division, Office of Basic Energy Sciences, Office of Science, U.S. Department of Energy, 2004-present

Program Manager and Principal Investigator, Bureau of Economic Geology/Gas Research Institute Tight Gas Sands Program, 1990-1994

## Activities of a Professional Nature

Theme issue editor, Journal of Structural Geology, Spatial Arrangements of Fractures and Faults (July 1, 2015-December 1, 2017)

Chair and meeting organizer, Geomechanics and Fracture Growth, Department of Energy Basic Energy Sciences workshop (May 8-11, 2016)

Panelist, Academic Career Start Faculty Panel, University of Texas at Austin (November 13, 2015)

Editorial Board Member, The Open Petroleum Engineering Journal, 2008-present

Guest Editor, Interpretation (SEG-AAPG journal), special section, "Optimizing Unconventional Reservoir Development and Production"

Guest Editor, The Leading Edge, theme issue "Hydraulic fracturing: Modern and Novel Methods"

## Funding

### Research Support

Principal Investigator: Fracture Opening Processes, Chemical Sciences, Geosciences and Biosciences Division, Office of Basic Energy Sciences, Office of Science, U.S. Department of Energy (2004-2018).

Principal Investigator: RPSEA Marcellus Shale Project, (2010 - 2011).

Principal Investigator: Fracture Research and Application Consortium (1997-2011).

Principal Investigator: RPSEA New Albany Shale Project, (2007 - 2009).

Principal Investigator: Jackson School of Geosciences Structural Diagenesis Initiative, (2004 - 2009).

Principal Investigator: Bureau of Economic Geology/Gas Research Institute Tight Gas Sands Program (January 1, 1990-December 31, 1994).