

Dr. PETER H. HENNINGS, P.G.
Research Scientist, Lecturer and Consulting Geologist

Bureau of Economic Geology
Jackson School of Geosciences
The University of Texas at Austin
peter.hennings@beg.utexas.edu
office: 512-471-0156

CRG Circle Ridge Geo LLC
1427 Circle Ridge Dr
West Lake Hills, TX 78746
jphennings@gmail.com
cell: 832-270-431

TECHNICAL and RESEARCH SPECIALTY:

Research program development and management, fund raising, analysis of induced and triggered seismicity, field and subsurface structural geology, seismic interpretation, characterization and hydraulic modeling of fractured and compartmentalized reservoirs, reservoir geomechanics, fault seal analysis, thrust belt kinematics, consultation for global exploration and producing projects.

Teaching field and classroom courses and workshops on seismic structural analysis, reservoir geomechanics, petroleum systems analysis, geology of the Laramide Rockies, geology of West Texas.

PRESENT STATUS:

Principal Investigator – Center for Integrated Seismicity Research, Bureau of Economic Geology, The University of Texas at Austin: research program design and management, industrial associate program development (raised \$5 million+ 2016-20), research in the areas of induced seismicity, structural geology, reservoir geomechanics, subsurface characterization and modeling.

Teaching: organized and taught over 100 field seminars and over 200 short courses.

Recent Teaching: Seismic Structural Analysis (UT Austin); Geological Field Camp (UT Austin); Application of Geomechanics to Reservoir Characterization, Management and Hydraulic Stimulation, Wyoming (RPS); Introduction to Petroleum Systems: Sources, Reservoirs, Traps, and Basins of the Laramide Rockies (AAPG, UWY); Thrust Belt Seismic Interpretation, Montana (RPS).

Professional Geoscientist, Texas, License Number 3887

EMPLOYMENT AND APPOINTMENT HISTORY:

2016- PI, Research Scientist & Lecturer, BEG, Jackson School of Geosciences, UT Austin.

- Principal Investigator for the Center for Integrated Seismicity Research (CISR)
- Managed CISR industrial affiliate program and grew membership to 20 companies
- Subsurface integration leader for the TexNet Seismic Monitoring and Research Program
- Stakeholder liaison and management
- Research staff supervision
- As Lecturer, teach *Seismic Structural Analysis* and 3 structural geology modules of *Field Camp*
- Service on graduate student committees, faculty search committees, other university service

2006- Adjunct Professor, Dept. of Geology and Geophysics, University of Wyoming.

- Teach structural interpretation short courses and geological field trips
- Service on graduate student committees

2011-18 Adjunct and Consulting Professor, Dept. of Geophysics, Stanford University.

- Collaborative research with the Zoback Stress and Crustal Mechanics Group
- Service on graduate student committees

2005-15 Manager Structure and Geomechanics Group, ConocoPhillips Technology & Projects.

- Design and management of a research, applications, and internal consultancy program
- Supervision of a specialty group that I grew from 2 to 25 people, staff resource management, career development, budget administration, cross-functional integration, internal and external program communication and marketing
- Coordination and participation in global technical service projects with personal emphasis in NW Shelf Australia, Sumatra, Vietnam, Eastern China, Nigeria, Kazakhstan, Norwegian North Sea, other areas
- Research Fellow specializing in seismic structural analysis, geomechanics, fractured reservoirs
- Developer and lead instructor for corporate structural geology training

2003-05 Sr. Scientist/Team Lead, Reservoir Structure, ConocoPhillips Subsurface Technology

- Same general responsibilities as the item above

2002-03 Manager Structural Analysis Group, ConocoPhillips Upstream Technology

- Same general responsibilities as the item above

1999-02 Structural Geology Technology Leader, Phillips Petroleum Co., Bartlesville, OK.

- Global Structural Geology Advisor
- Research program management
- Staff supervision
- Technical service consultation and projects with personal emphasis in Venezuela, Norwegian North Sea, Nigeria, China, other areas
- Research Scientist specializing in seismic structural analysis, geomechanics, fractured reservoirs
- Developer and lead instructor for corporate structural geology training

1998-99 Structural Geology Program Leader, Mobil Technology Co., Dallas, TX.

- Design and management of a research, applications, and internal consultancy program
- Coordination and participation in global technical service projects with personal emphasis in Sumatra, Vietnam, Nigeria, Kazakhstan, other areas
- Researcher specializing in seismic structural analysis, geomechanics, fractured reservoirs
- Conduct training in Seismic Structural Analysis and Compressional Structures Field Seminar

1991-98 Research Structural Geologist, Mobil Technology Co., Dallas, TX.

- Coordination and participation in global technical service projects with personal emphasis in Italy, Nigeria, US and Canadian Rocky Mountains, Sumatra, Vietnam, Western China, Peru, other areas
- Researcher specializing in seismic structural analysis, complexly deformed reservoirs
- Conduct training in Seismic Structural Analysis and Compressional Structures Field Seminar

1987-90 Texaco Fellow and Teaching Assistant, Dept. of Geological Sciences, UT Austin.

1988-90 Summer Intern, Mobil Research and Development Corp., Dallas, TX.

1987 Hydrogeologist Intern, Espey, Huston, and Assoc., Austin, TX.

1986 Research Assistant, Bureau of Economic Geology, UT Austin.

1984-86 Research and Teaching Assistant, Dept. of Geology, Texas A&M University

EDUCATION:

Ph.D. Geology (1991), The University of Texas, Austin

B.S. Geology (1983), M.S. Geology (1986), Texas A&M University, Center for Tectonophysics

HONORS AND PROFESSIONAL SERVICE:

AAPG Division of Environmental Geology Best Paper Award 2020

Walter Award for Outstanding Research, 2019, University of Texas Jackson School of Geosciences

Technical Chair 2019 AAPG Annual Conference and Exhibition

AAPG Distinguished Service Award, 2016

Founder and Chair of the AAPG Petroleum Structure and Geomechanics Division, 2012-15

AAPG Matson Award for Best Paper 2015

Chair AAPG Research Committee, 2010-2012; AAPG Associate Editor, 2002-15

Convener AAPG-SPE-SEG Fractured Reservoir Hedberg Conference & Volume Editor, 2008-9

ConocoPhillips Technology Achievement Award, 2007

ConocoPhillips Outstanding Mentor Award, 2005

AAPG Distinguished Lecturer, 2001-2

GSA Honorary Fellow, 2001

AAPG Levorsen Award for Best Paper, 1986

PATENTS

Schultz, R.A., Soofi, K.A., and Hennings, P.H., Satellite Geodesy and Reservoir Performance, Patent #US20160238704 A1, Aug 18, 2016.

Amendt, D.V., Buseti, S., D'Onfro, P.S., and Hennings, P.H., Mechanical Characterization of Core Samples, Patent #US20140373616 A1, Dec 25, 2014.

PUBLICATIONS AND PRESENTATIONS

***denotes papers or abstracts where I have sponsored the research and served as thesis committee member**

PAPERS

- Nicot, J.-P., Gao, R., Hennings, P. H., La Pointe, P., Smye, K., Horne, E. A., Dommissie, R., (Submitted 09/20/2020), Low pressure build-up with large disposal volumes of oilfield water A comprehensive hydrogeologic model of pore pressure change in the Ellenburger Group, Fort Worth Basin, North-Central Texas: AAPG Bulletin, BLTN20-159.
- Horne, E. A., Hennings, P. H., and Zahm, C. K., in revision (09/2020), Basement Structure of the Delaware Basin, in Callahan, O. A., Eichhubl, P., eds., The Geologic Basement of Texas: a volume in honor of Peter Flawn. Texas Bureau of Economic Geology.
- Smye, K. M., Hennings, P. Horne, E. A., 2020, Variations in Vertical Stress in the Permian Basin Region, [accepted] AAPG Bulletin.
- Horne, E. A., Hennings, P. H., Osmond, J. L., DeShon, H., 2020, Characteristics of potentially seismogenic faults in the greater Fort Worth Basin: Interpretation, v. 8, no. 2, 74 p., <https://doi.org/10.1190/int-2019-0188.1>.
- Hennings, P. H., Lund Snee, J-E., Osmond, J. L., DeShon, H. R., Dommissie, R., Horne, E. A., Lemons, C. and Zoback, M. D., 2019, Injection-Induced Seismicity and Fault Slip Potential in the Fort Worth Basin, Texas, Bulletin of the Seismological Society of America, <https://doi.org/10.1785/0120190017>
- Frohlich, C., Hayward, C., Rosenblit, J., Aiken, C., Hennings, P., Savvaidis, A., Lemons, C., Horne, E., Walter, J.L., DeShon, H.R., 2019, Onset and cause of increased seismic activity near Pecos, West Texas, USA from observations at the Lajitas TXAR Seismic Array, JGR Solid Earth, <https://doi.org/10.1029/2019JB017737>.
- Lemons, C., McDaid, G., Scanlon, B., Hennings, P. H., and Acevedo, J., 2019, Geographic, Stratigraphic, and Temporal Variation in Saltwater Disposal Practices of the Permian Region, Texas and New Mexico, USA, in final revision for AAPG Environmental Geosciences, DOI: 10.1306/eg.06201919002.
- Smye, K. M., Lemons, C. R., Eastwood, R., McDaid, G., and Hennings, P. H., 2019, Stratigraphic Architecture and Petrophysical Characterization of Formations for Deep Disposal in the Fort Worth Basin, TX., Interpretation, <https://doi.org/10.1190/INT-2018-0195.1>.
- Chen, R., Xue, X. Yao, C., Datta-Gupta, A., King, M., Hennings, P., & Dommissie, R., 2018, Coupled Fluid Flow and Geomechanical Modeling of Seismicity in the Azle Area North Texas, SPE, <https://doi.org/10.2118/191623-MS>.
- *Johri, M., Zoback, M., and Hennings, P., 2014, A scaling law to characterize fault-damage zones at reservoir depths: AAPG Bull., v. 98, p. 2057-79.
- Schultz, R., Soofi, K., Hennings, P., Tong, X., and Sandwell, T., 2014, Using InSAR to detect active deformation associated with faults in Suban field, South Sumatra Basin, Indonesia, The Leading Edge, August 2014, Vol. 33, No. 8: pp. 882-888.
- Flottman, T., Brooke-Barnett, S., Trubshaw, R., Naidu S., Kirk-Burnnand, E., Paul, P., Busetti, S., Hennings, P., 2013, Influence of In-Situ Stresses on Fracture Stimulations in the Surat Basin, Southeast Queensland, SPE-167064-MS.
- *Busetti, S., Mish, K., Hennings, P., and Reches, Z, 2012 Damage and plastic deformation of reservoir rocks: Part 2. Propagation of a hydraulic fracture, AAPG Bulletin, v. 96, p. 1711-1732.
- Hennings, P., Allwardt, P., Paul, P., and others, 2012, Relationship between fractures, fault zones, stress and reservoir productivity in the Suban gas field, Sumatra, Indonesia, AAPG Bulletin, v. 96, p. 753-772.
- *Paul, P., Zoback, M., and Hennings, P., 2011, A method to implement permeability anisotropy associated with fault damage zones in reservoir simulation, SPE 143305.
- Hennings, P., 2009, AAPG-SPE-SEG Hedberg research conference on "The Geologic Occurrence and Hydraulic Significance of Fractures in Reservoirs", AAPG Bulletin, v. 93, p. 1507-12.
- McLennan, J., Allwardt, P., Hennings, P., and Farrell, H, 2009, Multivariate fracture intensity prediction:

- Application to Oil Mountain anticline, Wyoming, AAPG Bulletin, AAPG Bulletin, v. 93, p. 1585-95.
- Zahm, C. and Hennings, P., 2009, Complex fracture development related to stratigraphic architecture: Challenges for structural deformation prediction, Tensleep Sandstone at the Alcova anticline, Wyoming, AAPG Bulletin, v. 93, p. 1427-46.
- *Paul, P., Zoback, M., and Hennings, P., 2009, Fluid flow in a fractured reservoir using a geomechanically-constrained fault zone damage model for reservoir simulation, SPE 110542.
- *Bergbauer, S., Mukerji, T., and Hennings, P., 2003, Improving curvature analysis of deformed horizons using scale-dependent filtering techniques: AAPG Bull., v. 87, p. 1255-1272.
- Hennings, P., Olson, J. E., and Thompson, L. E., 2000, Combining outcrop data and 3-d structural models to characterize fractured reservoirs with outcrop fracture and fault data for reservoir characterization: AAPG Bull., v. 84, p. 830-849.
- Hennings, P., 1999, Structural Geology in Reservoir Characterization [Book Review]: Journal of Structural Geology, v. 21, p. 246-7.
- Hennings, P. and Hager, R., 1996, Basement backthrusts and thin-skinned detachments in Gooseberry Field, Western Bighorn Basin, Wyoming: Wyoming Geol. Assoc. Guidebook, Resources of the Bighorn Basin.
- Hennings, P., 1994, Structural transect of the southern Chihuahua tectonic belt: Tectonics, v. 13, p. 1445-1460.
- Hennings, P. and Muehlberger, W. R., 1989, Laramide development of the eastern Chihuahua tectonic belt in Structure and Stratigraphy of Trans-Pecos Texas: 28th Inter. Geol. Congress Fieldtrip Guidebook T317: AGU.
- Hennings, P. and Spang, J. H., 1987, Sequential development of Dry Fork Ridge anticline, northeastern Bighorn Mountains, Wyoming and Montana: Contributions to Geology, Univ. of Wyoming Press, v. 25, p. 73-93.
- Hennings, P. and Spang, J. H., 1987, A method for determining fault geometry from rotated basement blocks using slip lines: The Mtn. Geol., Rocky Mtn Assoc. of Geol., v. 24, p. 30-32.

Conference ABSTRACTS

- Horne, E. A., Hennings, P. H., Morris, A., and Savvaidis, A., 2020, Structural Characterization and Seismogenic Association of Basement-Rooted Faults of the Delaware Basin, West Texas, GSA 2020 Annual Meeting, Montreal, Quebec, CA (Virtual).
- Callahan, O. A., Smye, K., Horne, E. A., Barnes, M. A., Eichhubl, P., Breton, C., and Hennings, P. H., 2020, The Geologic Basement in Texas: Results of a New State-Wide Synthesis, GSA 2020 Annual Meeting, Montreal, Quebec, CA (Virtual).
- Horne, E. A., Hennings, P. H., Savvaidis, A., Morris, A., Staniewicz, S., and Chen, J. A., 2020, 3D Structural Analysis and Seismogenic Association in the Central Delaware Basin, West Texas, American Geophysical Union, Fall Meeting 2020 (Virtual).
- Hennings, P. H., Dvory, N., Horne, E. A., Zoback, M., 2020, Slip Potential and Seismogenic Association of Basement-Rooted Faults in the Delaware Basin, West Texas, American Geophysical Union, Fall Meeting 2020 (Virtual).
- Gao, R., Nicot, J.-P., Hennings, P. H., Smye, K. M., Pelletier, I., Horne, E. A., (Submitted 07/29/2020), Preliminary Hydrogeological Modeling of Deep Injection in the Delaware Basin for Pore Pressure Characterization with Application to Induced Seismicity, American Geophysical Union, Fall Meeting 2020 (Virtual)
- Horne, E. A., Hennings, P. H., 2019, New 3D Structural Model of the Delaware Basin with Application to Understanding Recent Earthquakes, SPE/SEG Workshop: Injection Induced Seismicity - The Next Chapter, 2019, Dallas, Texas, USA.
- Peter Hennings, P. H., Gao, R. S., Nicot, J.-P., Horne, E. A., Smye, K., DeShon, H., 2019, Analysis of Seismogenic Pore Pressure Thresholds in the Fort Worth Basin from Comprehensive Hydrogeologic Modeling, SPE/SEG Workshop: Injection Induced Seismicity - The Next Chapter, 2019, Dallas, Texas, USA.
- Horne, E. A., Hennings, P. H., and Zahm, C. K., 2019, A New 3-D Structural Model and Characterization of

- Basement-Rooted Faults of the Delaware Basin and Central Basin Platform for Application in Understanding Recent Seismicity, American Association of Petroleum Geologists 2020 Annual Convention and Exhibition, Houston, Texas (Now Virtual). Callahan, O., Eichhubl, P., Hennings, P., Smye, K. G., Horne, L., Breton, C., Dommissive, R., Savvaidis, A., and Lemons, C., 2019, Texas Basement Synthesis Project: Understanding Geological Risk Factors of Basement-Involved Seismicity, 2019 AAPG Annual Convention and Exhibition.
- Hennings, P., Savvaidis, A., Nicot, J.-P., Eichhubl, P., Lemons, C., Smye, K. G., Horne, E., Dommissive, R., and Callahan, O., 2019, The Geology of Active Earthquake Sequences in Texas, AAPG Annual Convention and Exhibition. **(winner AAPG-DEG Award for Best Paper)**
- Horne, L., Hennings, P., and Zahm, C., 2019, 3D structural and kinematic model of the Delaware Basin and surrounding structural blocks for application in understanding recent seismicity, American Association of Petroleum Geologists 2019 Annual Convention and Exhibition, San Antonio, TX.
- Horne, L., Hennings, P., and Osmond, J., 2019, Characteristics of potentially seismogenic faults in the greater Fort Worth Basin, American Association of Petroleum Geologists 2019 Annual Convention and Exhibition, San Antonio, TX.
- Smye, K. G., Horne, L., and Hennings, P., 2019, Development of a three-dimensional vertical stress model for the greater Permian Basin region, American Association of Petroleum Geologists 2019 Annual Convention and Exhibition, San Antonio, TX.
- Haddad, M., Eichhubl, P., Horne, L., Hennings, P., and Lemons, C., 2019, Poroelastic models for fault reactivation in response to injection and production: application to an earthquake sequence near Venus, Johnson County, Texas, American Association of Petroleum Geologists 2019 Annual Convention and Exhibition, San Antonio, TX.
- Hennings, P., Lund Snee, J., Nicot, J.-P., Horne, L., and Zoback, M., 2019, Impact of varied approaches for fault slip potential analysis in the Fort Worth Basin, Texas, American Association of Petroleum Geologists 2019 Annual Convention and Exhibition, San Antonio, TX.
- Callahan, O., Eichhubl, P., Hennings, P., Smye, K. G., Horne, L., Breton, C., Dommissive, R., Savvaidis, A., and Lemons, C., 2019, Texas Basement Synthesis Project: Understanding Geological Risk Factors of Basement-Involved Seismicity, 2019 AAPG Annual Convention and Exhibition.
- Callahan, O., Eichhubl, P., Hennings, P., Smye, K. G., Horne, L., Savvaidis, A., Huang, D., Lemons, C., Breton, C., and Dommissive, R., 2019, Texas Basement Synthesis Project: Characterizing Geological Risk Factors of Basement-Involved Seismicity, 2019 GSA South-Central/North-Central/Rocky Mountain Section Meeting, Manhattan, KS.
- Quinones, L., DeShon, H., Hennings, P., Horne, L., and Gao, R., 2019, Modeling injection induced stress changes in the Fort Worth Basin, American Geophysical Union, Fall Meeting 2019, San Francisco, CA.
- Gao, R., Pelletier, I., Horne, L., Nicot, J.-P., and Hennings, P., 2019, Basin-scale hydrogeological modeling of the Fort Worth Basin Ellenburger Group for pore pressure characterization (abs.): Abstract H53C-01 presented at AGU 2019 Fall Meeting, San Francisco, Calif., December 9–13.
- Gao, R., Pelletier, I., Horne, L., Nicot, J.-P., and Hennings, P., 2019, Basin-scale hydrogeological modeling of the Fort Worth Basin Ellenburger Group for pore pressure characterization (abs.): Abstract H53C-01 presented at AGU 2019 Fall Meeting, San Francisco, Calif., December 9–13.
- Ge, J., Hosseini, S. A., Smye, K. G., Banerji, D., Nicot, J.-P., and Hennings, P., 2019, Hydrogeological modeling and pore pressure characterization of Delaware Mountain Group in the Delaware Basin, Texas and New Mexico (abs.): Abstract H51L-1640, presented at AGU 2019 Fall Meeting, San Francisco, Calif., December 9–13.
- Nicot, J.-P., Gao, R., Hennings, P., and Dommissive, R., 2019, Basin-scale hydrogeological modeling of the Fort Worth Basin Ellenburger Group for pore pressure characterization (abs.): AAPG Annual Convention & Exhibition, San Antonio, Tex., 19-22 May.
- Smye, K. G., Banerji, D., Hamlin, H. S., Eastwood, R. L., Lemons, C., McDaid, G., and Hennings, P., 2019, Stratigraphic and facies architecture of the Delaware Mountain Group, Delaware Basin: implications for disposal of hydraulic fracturing wastewater (abs.): AAPG Annual Convention & Exhibition, San Antonio, Tex., 19-22 May.
- Young, M. H., Hennings, P., and Savvaidis, A., 2019, TexNet / CISR—monitoring and analyzing earthquake activity in Texas (abs.): presented at the Texas Commission on Environmental Quality

- (TCEQ) Environmental Trade Fair and Conference, Austin, TX. Quinones, L., DeShon, H., Hennings, P., Horne, E., Gao, R., 2020, Modeling Injection Induced Stress Changes in the Fort Worth basin, Texas, GSA S. Central Meeting.
- Young, M. H., Hennings, P., and Savvaidis, A., 2019, TexNet/CISR Monitoring and analyzing earthquake activity in Texas (abs.): presented at the Texas Commission on Environmental Quality (TCEQ) Environmental Trade Fair and Conference, Austin, TX.
- Lemons, C., McDaid, G., Acevedo, J., Breton, C., and Hennings, P. H., 2019, Geographic, Stratigraphic, and Temporal Variation in Saltwater Disposal Practices of the Permian Region, Texas and New Mexico, USA, AAPG Annual Conference and Exhibition.
- Haddad, M., Eichhubl, P., Horne, E. A., Hennings, P. H., and Lemons, C., 2019, Poroelastic Models for Fault Reactivation in Response to Disposal and Production: Application to an Earthquake Sequence near Venus, Johnson County, Texas. Abstract AAPG Annual Conference and Exhibition.
- Hennings, P. H. H., Lund Snee, J-E., Horne, E. A., Zoback, M. D., 2019, Impact of Varied Approaches for Fault Slip Potential Analysis in the Fort Worth Basin, Texas, AAPG Annual Conference and Exhibition.
- Hennings, P. H., Savvaidis, A., Nicot, J.-P., Eichhubl, P., Lemons, C., Smye, K., Horne, E. A., Dommissie, R., Callahan, O., 2019, The Geology of Active Earthquake Sequences in Texas, AAPG Annual Conference and Exhibition.
- Horne, E. A., Hennings, P. H., and Osmond, J. L., 2019, Characteristics of Potentially Seismogenic Faults in the Greater Fort Worth Basin, AAPG Annual Conference and Exhibition.
- Horne, E. A., Hennings, P. H., Zahm, C. K., 2019, 3D Structural and Kinematic Model of the Delaware Basin and Surrounding Structural Blocks for Application in Understanding Recent Seismicity, AAPG Annual Conference and Exhibition.
- Lemons, C. R., McDaid, G., Acevedo, J., Breton, C. L., Hennings, P. H., 2019, Geologic, Geographic, and Temporal Variations in Saltwater Disposal Practices within the Permian Region, Texas and New Mexico, USA, AAPG Annual Conference and Exhibition.
- Morris, A., Hennings, P. H. H., Horne, E. A., 2019, Quantifying Fault Stability in the Fort Worth Basin, Texas, AAPG Annual Conference and Exhibition.
- Smye, K. M., Banerji, D. A., Hamlin, H. S., Eastwood, R., Lemons, C. R., McDaid, G., and Hennings, P. H., 2019, Stratigraphic and Facies Architecture of the Delaware Mountain Group, Delaware Basin: Implications for Disposal of Hydraulic Fracturing Wastewater, AAPG Annual Conference and Exhibition.
- Smye, K. M., Horne, E. A., and Hennings, P.H., 2019, Development of a Three-Dimensional Vertical Stress Model for the Greater Permian Basin Region, AAPG Annual Conference and Exhibition.
- Whittaker, S., Savvaidis, A., Hennings, P. H., Morris, A., 2019, Seismicity of Eagle Ford Since the Implementation of TexNet Earthquake Catalog January 1, 2017, AAPG Annual Conference and Exhibition.
- Xiao, J., Lemons, C., Hennings, P. H., and Pycrz, M., 2019, Geostatistical Analysis of Injection Activity and Seismic Events in the Dallas-Fort Worth Region, AAPG Annual Conference and Exhibition.
- Callahan, O., Eichhubl, P., Zahm, C., Kyle, R., Hennings, P., 2019, Factors Influencing Rock Strength and Fluid Flow at the Basement-Sediment Interface from Field- and Core-Based Observations, Llano Uplift, Texas, GSA Annual Convention.
- Gao, R., Nicot, J.-P., Dommissie, R. D., and Hennings, P. H., 2018, Basin-Scale Hydrogeological Modeling of the Fort Worth Basin Ellenburger Group for Pore Pressure Characterization, American Geophysical Uni+F48:F106on, Fall Meeting 2018.
- Hennings, P. H., 2018, TexNet-CISR Integrated Seismicity Assessment of Permian Basin Region, American Association of Petroleum Geologists AAPG Southwest Section Convention.
- Horne, E. A., Zahm, C. K., and Hennings, P. H., 2018, Development of a 3D Geometric and Kinematic Model of the Delaware Basin and Surrounding Blocks, AAPG Southwest Section Convention.
- Hennings, P., Osmond, J., Dommissie, R., and Nicot, J.-P., 2018, Development of a deterministic seismicity potential assessment of the Fort Worth Basin, AAPG Annual Convention & Exhibition.
- Horne, E. A., Hennings, P. H., and Zahm, C. K., 2018, 3D Structural and Kinematic Model of the Delaware Basin and Surrounding Structural Blocks for Application in Understanding Recent Seismicity, American

Geophysical Union, Fall Conference and Exhibition.

- Lemons, C., Hennings, P. H., and McDaid, G., 2018, Saltwater Disposal Practices and History in the Permian Basin Region, with Application to Disposal Resource and Induced Seismicity Assessment, AAPG Southwest Section Convention.
- Lemons, C., McDaid, G., Smye, K., and Hennings, P. H., 2018, The Evolution of Saltwater Disposal Practices in the Fort Worth and Delaware Basins of Texas and New Mexico, USA, Geological Society of America South-Central Meeting.
- Savvaidis, A., Young, B. Mukherjee, T. Hennings, P. H. Rathje, E. Zalachoris, G., Young, M. H., Walter, J. I., DeShon, H.R and C., Frohlich, 2018, Site Assessment of a New State-Wide Seismic Network in Texas (TexNet), Annual Meeting of the America Geophysical Union, San Francisco, California.
- Chen, R., Xue, X., Yao, C., Datta-Gupta, A., King, M. J., Hennings, P., & Dommissie, R., 2018, Coupled Fluid Flow and Geomechanical Modeling of Seismicity in the Azle Area North Texas, SPE 191623 Presented at the 2018 Annual Technical Conference, Dallas, TX.
- Hennings, P. H. H., Lund Snee, J-E., Osmond, J. L., 2017, Fault Slip Potential of the Ft. Worth Basin, SEG/SPE Workshop: Injection-Induced Seismicity – Intersection of Evolving Science and Regulations.
- Hennings, P. H., Osmond, J. L., Lund Snee, J-E., and Zoback, M., 2017, Slip Potential of Faults in the Fort Worth Basin, American Geophysical Union, Fall Meeting, abstract #S22B-05.
- Hennings, P. H., Osmond, J. L., Zahm, C. K., and DeShon, H. R., 2017, Characterization of Faults on the Flanks of the Llano Uplift for Application to Understanding Seismogenic Faults in the Subsurface of the Fort Worth Basin, American Association of Petroleum Geologists Annual Convention and Exhibition.
- Hennings, P. H., Osmond, J. L.L., Zahm, C. K. K., DeShon, H. R., 2017, Characterization of Faults on the Flanks of the Llano Uplift for Application to Understanding Seismogenic Faults in the Subsurface of the Fort Worth Basin, AAPG Annual Convention and Exhibition.
- Hennings, P. H., Savvaidis, A., Rathje, E., Olson, J. E., DeShon, H. R., Datta-Gupta, A., Eichhubl, P., Nicot, J.-P., and Kahlor, L. A., 2017, Recent Seismicity in Texas and Research Design and Progress of the TexNet-CISR Collaboration, American Geophysical Union, Fall Meeting 2017, abstract #NS21A-02.
- Lemons, C., Hennings, P. H., Dommissie, R., Nicot, J.-P., and Smye, K. G., 2017, Protocols and Common Pitfalls in Disposal Data Handling for Induced Seismicity Geomodels, Unconventional Resources Technology Conference (URTeC), SEG-AAPG-SPE Paper #2667788.
- Nicot, J.-P., Gao, R. S., Dommissie, R., and Hennings, P. H., 2017, Basin-Scale Hydrogeological Modeling of the Fort Worth Basin Ellenburger Group for Pore Pressure Characterization, American Geophysical Union, Fall Meeting 2017, abstract #H53A-1428.
- Savvaidis, A., Hennings, P. H., Huang, H. D., Aiken, C., Young, B., Osmond., J. L., 2017, A First Look at Active Seismicity in the Delaware Basin (West Texas), SEG/SPE Workshop: Injection-Induced Seismicity – Intersection of Evolving Science and Regulations.
- Savvaidis, A., Lomax, A., Aiken, C., Young, B., Huang, D., and Hennings, P. H., 2017, TexNet Seismic Network Performance and Reported Seismicity in West Texas, American Geophysical Union, Fall Meeting 2017, abstract #S22B-07.017.
- Young, M. H., Hennings, P. H., Savvaidis, A., and Rathje, E., 2017, TexNet and CISR: an Update on Monitoring and Understanding Seismicity in Texas: Groundwater Protection Council UIC Conference, Austin, TX.
- Hennings, P. H., 2016, Geologic Considerations that Should Inform Engineering Perspectives: SPE/SEG Workshop: Injection Induced Seismicity – Engineering Integration, Evaluation & Mitigation.
- Savvaidis, A., Young, M., Tinker, S., Rathje, E. M., Frohlich, C. A., Walter, J., De Shon, H., Gale, J. F., Hennings, P, Eichhubl, P, Olson, J., Olson, H. C., Markman, A., Kahlor, L. A., TEXNET: A New, Integrated Seismic Monitoring Program in Texas, Seismological Society of America Meeting, 2016, Seismological Research Letters, v. 87, n. 2B, p. 495.
- Savvaidis, A., Young, B., Hennings, P., Rathje, E., Zalachoris, G., Young, M.H., Walter, J.I., DeShon, H.R., and Frohlich, C., 2017, Site assessment of a new state-wide seismic network in Texas (TexNet), USA, in EGU General Assembly Conference Abstracts, v. 19, p. 11387.
- Hennings, P., Osmond, J., Zahm, C., DeShon, 2017, Characterization of Faults on the Flanks of the Llano Uplift for Application to Understanding Seismogenic Faults in the Subsurface of the Fort Worth Basin

- [Abstract]: AAPG Annual Meeting and Exhibition.
- Hennings, P., 2016, Geologic Considerations that Should Inform Engineering Perspectives [Abstract]: SPE/SEG Workshop: Injection Induced Seismicity – Engineering Integration, Evaluation & Mitigation.
- *Horne, E. and Hennings, P., 2015, Using a New 3-D Structural Model of the Wyoming Laramide Rockies Basement for Static Characterization and Kinematic Reconstruction [Abstract]: AAPG Annual Mtng.
- Hennings, P., and Csoma, A., 2014, Relationship between Reservoir Quality and the Deformation associated with Anticlinal Folding in the Tensleep Sandstone at Alcova Reservoir, Central Wyoming, USA [Abstract]: AAPG Annual Mtng (**winner AAPG Matson Award for Best Paper**)
- Hennings, P., and Csoma, A., 2013, Relationship between Reservoir Quality and the Deformation associated with Anticlinal Folding in the Tensleep Sandstone at Alcova Reservoir, Central Wyoming, USA [Abstract]: GSA Annual Mtng.
- *Johri, M., Zoback, M., Dunham, E., and Hennings, P., 2013, Fault Damage Zones-Observations, Dynamic Rupture Modeling and Implications on Fluid Flow [Abstract]: AAPG Annual Mtng.
- Hennings, P., 2012, Petroleum Structure and Geomechanics – What it is and how the industry/academic bond can be strengthened [Abstract]: GSA Annual Mtng.
- Hennings, P., Allwardt, P., Paul, P., and others, 2012, Relationship between fractures, fault zones, stress and reservoir productivity in the Suban gas field, Sumatra, Indonesia [Abstract]: AAPG Annual International Mtng.
- *Kennedy, L., Erslev, E., and Hennings, P., 2011, Determining the origin of structural variability in the easternmost Wind River Basin using fracture analysis and 3D restoration [Abstract]: AAPG Rockies Section Meeting.
- Paul, P., Neely, T., Allwardt, T., Hennings, P., and others, 2011, Geomechanical controls on the gas production in the North Parachute area, Colorado [Abstract]: AAPG Annual International Mtng.
- Hennings, P., McLennan, J., Allwardt, T., 2010, Combining structural analysis and Bayesian statistics to quantify the importance of multiple fracture causing agents: Applied technology illustrated with a Wyoming structure [Abstract]: GSA Annual International Mtng.
- Ratliff, R., Hennings, P., 2009, Benefits of using iterative restoration and forward modeling for balanced cross section construction: An example from the Sun River Canyon, Montana [Abstract]: GSA Annual International Mtng.
- Hennings, P., McLennan, J., Allwardt, T., 2009, Building better fracture models by combining structural analysis and Bayesian Updating to quantify the relationship between multiple fracture causing agents [Abstract]: AAPG Annual International Mtng. (**winner of AAPG Top Ten Oral Presentation**)
- *Paul, P., Zoback, M., Hennings, P., 2008, A methodology for incorporating geomechanically constrained fault damage zones into reservoir simulation: AAPG Annual Mtng. (**winner of AAPG Top Ten Poster Presentation**)
- *Paul, P., Zoback, M., and Hennings, P., 2007, Fluid flow in a fractured reservoir using a geomechanically-constrained fault zone damage model for reservoir simulation, SPE 110542.
- *Paul, P., Zoback, M., Hennings, P., 2007, Modeling the permeability anisotropy due to reservoir-scale fault damage zones using dynamic rupture propagation: applications to a faulted hydrocarbon reservoir and the Nojiima fault [Abstract]: AGU Annual International Mtng.
- Hennings, P., Zahm, C., Krieger, F., Sanner, D., Lazada, T., Reid Jr, R., 2006, Bayu-Undan – Modeling Permeability Enhancement in Fault Damage Zones [Abstract]: AAPG Annual International Mtng.
- Hennings, P., Pujasmadi, B., Alley, H., Zahm, C., Reid Jr, R., Enderlin, M., Lee, B., Kirschner, R., 2006 Relationship between active deformation, stress heterogeneity, and fracture permeability in the Suban Gas Field of south Sumatra, Indonesia [Abstract]: AAPG Annual Mtng.
- Hennings, P., Ramos, R., Enderlin, M., Maerten, L., Shafer, David., Krantz, R., Alvord, C., Crabtree, Cliff., 2004, Fault stress modeling of Alpine Field with application to drilling difficulty mitigation [Abstract]: AAPG Annual Mtng.
- Erslev, E. and Hennings, P., 2003, Kinematic Evolution of detachment folds, offshore Brunei, Indonesia [Abstract]: AAPG Annual Mtng.
- *Zahm, C., Raba'a, A., Hurley, N., and Hennings, P., 2003, The use of 3-D strain in outcrop to predict subsurface reservoir compartmentalization, Southern Bighorn Basin, WY [Abstract]: AGU Annual Mtng.

- *Bergbauer, S., Mukerji, T., and Hennings, P., 2003, Improving Curvature Analyses of Deformed Horizons Using Scale-Dependent Filtering Techniques [Abstract]: AAPG Annual Mtng.
- *Bergbauer, S., Mukerji, T., Pollard, D., Hennings, P., Calculation of scale-dependent curvatures of geological surfaces [Abstract]: AGU Annual Mtng.
- Erslev, E., Hennings, P., Zahm, C., 2001, Kinematics and structural closure of basement-involved anticlines in the central Rocky Mountains Petroleum Province [Abstract]: 2001 AAPG Annual Mtng.
- Hennings, P., Enderlin M., Thrasher T., Gamwell T., Abry C., 2001, Predicting field-wide well performance in fractured carbonates by calibrating structural attributes with wellbore and production data, Ambrosio Field, western Venezuela [Abstract]: AAPG Annual Mtng.
- Hennings, P. and Thompson, L. B., 2000, Calibrating 3d geometric models for fractured reservoir characterization: AAPG Rocky Mountain Section Mtng. (**winner AAPG Levorsen Award for Best Paper**)
- *Zahm, C. K. and Hennings, P., 2000, Kinematics of Tear Faulting in Structurally Attenuated Strata, Thermopolis Anticline, Wyoming: Geol. Soc. America Cordillera Section Meeting.
- Hennings, P. and Thompson, L. B., 1999, Calibrating 3d geometric models for fractured reservoir characterization: Geol. Soc. of London Fracture and In-Situ Stress Conf.
- *Johnson, C. D. and Hennings, P., 1999, Using displacement-gradient analysis to streamline 3d geometric model construction and provide important insights into thrust-system evolution [Abstract]: 1999 AAPG Annual Mtg.
- Hennings, P. and Thompson, L. B., 1999, Calibrating 3d geometric models for fractured reservoir characterization: Geol. Soc. of London Fracture and In-Situ Stress Conf.
- *Johnson, C. D. and Hennings, P., 1999, Using displacement-gradient analysis to streamline 3d geometric model construction and provide important insights into thrust-system evolution [Abstract]: 1999 AAPG Annual Meeting.
- Hennings, P., and Olson, J. E., 1999, Quantitatively calibrating 3d structural models for prediction of fracture intensity and reservoir compartmentalization [Abstract]: 1999 AAPG Annual Meeting.
- Olson, J. E., Hennings, P., and Laubach, S. E., 1998, Integrating wellbore data and geomechanical modeling for effective characterization of naturally fractured reservoirs [Extended Abstract]: Society of Petroleum Engineers, Eurock Conv.
- Hennings, P., Olson, J. E., and Thompson, L. T., 1997, Using Outcrop Data to Calibrate 3-D Geometric Models for Prediction of Reservoir-Scale Deformation: An Example from Wyoming [Abstract]: 1998 RMAG Fractured Reservoir Symposium.
- Hennings, P., 1997, Relationship between 3D Surface Curvature, Flexural-Slip Strains, and Fracture Occurrence in a Clastic Reservoir Volume within a Fault-Propagation Fold [Abstract]: 1997 AAPG Hedberg Conf.
- Hennings, P., 1997, Basement backthrusts and thin-skinned detachments in Gooseberry Field, western Bighorn Basin, Wyoming [Abstract]: 1997 WBRA Bighorn Basin Symposium.
- Hennings, P., 1997, Creating restorable models of contractional basement structures using lithology-specific deformation mechanisms [Abstract]: 1997 WBRA Bighorn Basin Symposium.
- Hennings, P. and Prine, B. H., 1987, The effects of horizontal fault curvature and displacement on thrust closure geometry [Abstract]: AAPG Annual Meeting.
- Hennings, P. and Olson, J. E., 1997, The relationship between bed curvature and fracture occurrence in a fault-propagation fold [Abstract]: AAPG Annual Meeting.
- Smith-Rouch, L. S., Meisling, K. E., Hennings, P., Armentrout, J. M., 1997, Tectono-stratigraphic computer experiments [Abstract]: AAPG Annual Meeting.
- Olson, J. E. and Hennings, P., 1996, Regional versus local fracturing in a Laramide fault propagation fold, Oil Mountain, Wyoming [Abstract]: GSA Prog. with Abs.
- Hennings, P., 1996, Creating restorable models of contractional basement structures using lithology-specific deformation mechanisms [Abstract]: AAPG Rocky Mtn. Section Meeting.
- Hennings, P., Prine, B. H., and Wickham, J. S., 1996, 3D structural analysis and visualization of oblique-ramp accommodation structures in thrust sheets [Abstract]: AAPG Annual Meeting.
- Spratt, D. A., Simony, P. S., Price, R. A., MacKay, P. A., Kubli, T. E., Hennings, P., Prine, B. H., and Wickham, J. S., 1995, Fault-related folding in the Foothills and Front Ranges of Southern Alberta: Field Trip Guidebook, GSA Penrose Conf., Banff, Alberta, 96 p.

- Hennings, P. and Hager, R., 1994, Basement backthrusts and thin-skinned detachments combine to form productive structures in the western Bighorn Basin, Wyoming [Abstract]: AAPG Annual Meeting.
- Hennings, P., 1991, Deformation path and cross section restoration of an evaporite-cored anticline using strains of cross-cutting calcite veins: GSA Prog. with Abs., v. 23.
- Hennings, P. and Muehlberger, W. R., 1990, Laramide fault inversion, basement buttressing, and evaporite tectonics in the Cordilleran thrust front along the Texas/Chihuahua Border: GSA Prog. with Abs., v. 22.
- Hennings, P. and Muehlberger, W. R., 1990, Structural geometry of the southern Chihuahua tectonic belt: Symposium on Energy Resources of the Chihuahua Desert, Universidad Autonoma de Chihuahua.
- Hennings, P. and Muehlberger, W. R., 1988, Structural transect of the Chihuahua tectonic belt between Ojinaga and Aldama, Chihuahua, Mexico: GSA Prog. with Abs., v. 20, p. A385.
- Hennings, P. and Spang, J. H., 1986, Petrofabric implications for cover rock adjustment in a basement cored anticline: Dry Fork Ridge, Bighorn Mountains, Wyoming: GSA Prog. with Abs., v. 18, p. 635.
- Motes, J. L., Hennings, P. and Spang, J. H., 1986, Systematic variation in mountain flank geometry, northeast Bighorn Mountains, Wyoming: GSA Prog. with Abs., v. 18, p. 397.
- McConnell, D. A., Hennings, P. and Spang, J. H., 1986, A kinematic model for foreland basement uplifts: GSA Prog. with Abs., v. 18, p. 395.
- Hennings, P. and Spang, J. H., 1985, Crystalline basement geometry from three-dimensionally balanced cross sections, Dry Fork Ridge, northeastern Bighorn Mountains, Wyoming: GSA Prog. with Abs., v. 17, p. 607.
- Hennings, P., 1985, Structural elements of Dry Fork anticline termination, northeastern Bighorn Mountains, Wyoming: GSA Prog. with Abs., v. 17, p. 161. **(winner for GSA Best Student Paper)**