New Projects

We appreciate the support of Statoil in its sponsorship of three student fellowship projects: *Path-Integral Seismic Diffraction Imaging of Fractured Shale Reservoirs* (Dmitrii Merzlikin), *Characterization of Fractured Shale Reservoirs Using Anelliptic Parameters* (Yanadet Sripanich), *Elastic Multi-parameter Waveform Inversion for Subsalt Imaging* (Zhiguang Xue).

TCCS Staff

The TCCS group consists of people from five different countries who have come together to move science forward. Our research staff includes two principal investigators, six Ph.D. students, two M.S. students, a postdoc, a B.S. student, and a senior research fellow:

Sean Bader (M.S. 1st year)
Björn Engquist (PI)
Sergey Fomel (PI)
Sarah Greer (B.S. 3rd year)
Dmitrii Merzlikin (Ph.D. 3rd year)
Mason Phillips (M.S. 2nd year)
Karl Schleicher (Senior Research Fellow)
Yunzhi Shi (Ph.D. 2nd year)
Yanadet Sripanich (Ph.D. 4th year)
Junzhe Sun (Ph.D. 5th year)
Xinming Wu (Postdoc)
Zhiguang Xue (Ph.D. 4th year)
Yunan Yang (Ph.D. 4th year)

For more information, see http://www.beg.utexas.edu/tccs/staff.

New faces

Sean Bader received his B.S. degree in geophysics/geophysical engineering from Colorado School of Mines in 2015. His previous experience is with the application of seismic attributes as an aid to interpretation. Sean is currently an M.S. student working with Sergey Fomel at TCCS. His interests are in the understanding and integration of all available data—well log, seismic, geologic, and computational methods—so that we can paint a complete picture of the subsurface. After graduation, he hopes to work in the energy industry.

Hanming Chen is pursuing his Ph.D. in geophysics under the supervision of Prof. Hui Zhou at China University of Petroleum–Beijing (CUPB). Hanming obtained his master's and bachelor's degrees from CUPB and Yangtze University, respectively. His research interests include seismic modeling and inversion. Hanming received a scholarship from the Chinese government in support of his visit to TCCS in 2016–2017.

Xiaokai Wang is a visiting scholar from Xi'an Jiaotong University (XJTU). He received his bachelor's degree in information engineering from XJTU in 2006 and his Ph.D. in communication engineering from XJTU in 2012. From 2012 to 2014, he was a postdoctoral fellow at the Institute of Geology and Geophysics, Chinese Academy of Sciences. He joined the department of computational geophysics at XJTU in 2015. His research interests focus on time-frequency analysis and its applications in seismic data processing.

Testimonials

Tieyuan Zhu (currently Assistant Professor, Pennsylvania State University)

Looking back, when I made the decision about the place for my postdoc, I think no better decision could have been made than joining the TCCS group. I enjoyed my short (2 years) stay as a member of TCCS. TCCS provided me with a great research environment and lots of reproducible resources. TCCS people are open-minded and great scholars to work with. Much has been achieved in the past 2 years.

TCCS is a young and fast-growing group, and has established its reputation for solving the challenging problems in exploration geophysics and training the next generation of exploration geophysicists. TCCS advocates the spirit of reproducible research in seismic imaging and signal processing, which made all developed codes and documents publicly available. Researchers from all over the world were beneficial. If I were a student just starting out, I would definitely want to join TCCS to pursue my degree.

Guoning Wu (Associate Professor, China University of Petroleum - Beijing)

The past year in TCCS is a cherished memory for me. The most important thing I learned from the researchers at TCCS and Dr. Fomel is the passion for research and the collaborative atmosphere. Dr. Fomel tries his best to provide an environment in which all of us can think deeply and freely, and we can discuss our ideas with each other. The Madagascar open-source software package is a great platform that has helped me to conduct meaningful research efficiently. The most important thing is that I can always learn about new ideas from the reproducible papers made available in Madagascar, which will be helpful in my future works.

Professional Awards

At the upcoming SEG Annual Meeting in Dallas, **Zhiguang Xue** will receive the Best Student Poster award for his presentation of *Full-Waveform Inversion with Sparsity Constraint in Seislet Domain* at the 2015 SEG Annual Meeting in 2015. In the last 5 years, TCCS students have been awarded two Best Student Poster awards and two Awards of Merit for their presentations at SEG meetings.

TCCS Texas Consortium for Computational Seismology

Fall 2016 Newsletter

www.beg.utexas.edu/tccs/

Texas Consortium for Computational Seismology • The University of Texas at Austin

Welcome to the tenth TCCS newsletter!

The Texas Consortium for Computational Seismology (TCCS) is a joint initiative of the Bureau of Economic Geology (BEG) and the Institute for Computational Engineering and Sciences (ICES) at The University of Texas at Austin. Its mission is to address the most important and challenging research problems in computational geophysics as experienced by the energy industry while educating the next generation of research geophysicists and computational scientists.

TCCS Sponsors

TCCS appreciates the support of its 2016 sponsors: BP, Chevron, ConocoPhillips, ExxonMobil, FairfieldNodal, Saudi Aramco, Statoil, and Total.

Fall Meeting

The Fall 2016 Research Meeting of the TCCS will take place in Austin on October 24–25. Hosted by the Bureau of Economic Geology, it will be held at The University of Texas at Austin, J. J. Pickle Research Campus.

Representatives of participating companies are invited to register for the meeting by following the link at http://www.beg.utexas.edu/tccs/.

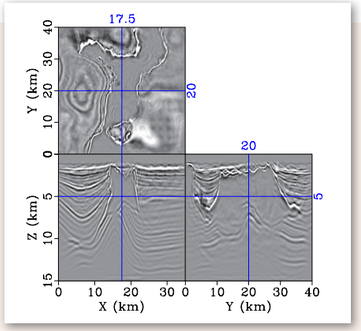
Presentations at SEG in Dallas

TCCS members and collaborators will make a number of presentations at the upcoming SEG 2016 Annual Meeting in Dallas.

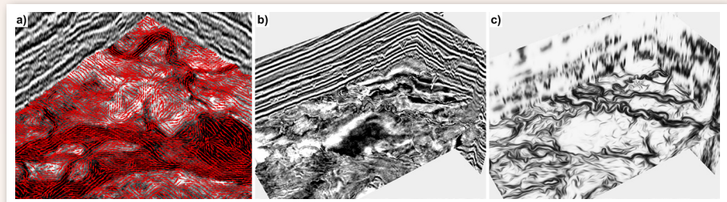
Monday, Oct. 17	1:00 pm	FWI E-P1: Methodology and Development 3	Y. Yang, B. Enquist and J. Sun	Convexity of the quadratic Wasserstein metric as a misfit function for full-waveform inversion
	1:00 pm	SPMI 1: Elastic Imaging	J. Sun, S. Fomel, Y. Sripanich, and P. Fowler	Recursive integral time extrapolation of elastic waves using lowrank approximation
	1:25 pm	FWI 1: Methodology and Development	Z. Xue, J. Sun, S. Fomel, and T. Zhu	Q-compensated full-waveform inversion using constant-Q wave equation
	2:15 pm	INT 1: Interpretation Methodologies and New Techniques	X. Wu and G. Caumon	Simultaneous multiple well-seismic ties using flattened synthetic and real seismograms
	3:20 pm	FWI E-P1: Methodology and Development	J. Sun, Z. Xue, S. Fomel, T. Zhu, and N. Nakata	Full-waveform inversion of passive seismic data for sources and velocities
	3:20 pm	INT E-P1: Fault Detection and Enhancement Methods	M. Phillips, S. Fomel, and R. Swindeman	Structure-oriented plane-wave Sobel filter for edge detection in seismic images
	4:35 pm	INT 1: Interpretation Methodologies and New Techniques	X. Wu	Methods to compute salt likelihoods and extract salt boundaries from 3D seismic images
Tuesday, Oct. 18	8:00 am	INT 2: Spectral Decomposition Methods and Usage	G. Wu, S. Fomel, and Y. Chen	Data-driven time-frequency analysis of seismic data using regularized nonstationary autoregression
	8:50 am	SI 2: Theory and Application	R. Zhang and S. Fomel	Application of predictive painting to well-log data interpolation and seismic inversion
	10:18 am	TL E-P1: CO2 Monitoring and OBN	P. Karimi, S. Fomel, and R. Zhang	Time-lapse image registration using the stratigraphic-coordinate system
	3:45 pm	PS 3: Imaging Methods	Y. Shi, D. Merzlikin and S. Fomel	Microseismic source localization using time-domain path-integral migration
	4:10 pm	PS 3: Imaging Methods	N. Nakata, G. Beroza, J. Sun, and S. Fomel	Migration-based passive-source imaging for continuous data
Wednesday, Oct. 19	8:00 am	SPIR 1 Seismic Data Reconstruction	S. Fomel	Fast scattered data gridding
	8:50 am	SPIR 1: Seismic Data Reconstruction	K. Regimbal and S. Fomel	High-resolution recursive stacking using plane-wave construction
	8:50 am	FWI EP-2: Methodology and Development	H. Zhu and S. Fomel	Applications of adaptive matching filter in full waveform inversion
	9:15 am	SPNA E-P1: Algorithms	S. Fomel and J. Claerbout	Streaming prediction-error filters
	9:15 am	SPMI 4: Diffraction and Non-Specular Imaging and Sim Sources	D. Merzlikin, S. Fomel, and A. Bona	Diffraction imaging using azimuthal plane-wave destruction
	10:45 am	SPMI 4: Diffraction and Non-Specular Imaging and Sim Sources	D. Merzlikin and S. Fomel	Least-squares path-integral diffraction imaging using sparsity constraints
	3:35 pm	ANI P1: Modeling and AVO Analysis for TI and Orthorhombic Media	Y. Sripanich, S. Fomel, and P. Fowler	A comparison of anisotropic parameterizations for TI and orthorhombic media and their sensitivity with respect to qP velocities
	4:25 pm	TL 2: Methods and Acquisition	M. Phillips and S. Fomel	Seismic time-lapse image registration using amplitude-adjusted plane-wave destruction
Thursday, Oct. 20	9:20 am	FWI 8: Overcoming Cycle Skipping	Z. Xue, N. Alger, and S. Fomel	Full-waveform inversion using smoothing kernels
	10:10 am	PS 5: Case Studies and Applications	T. Zhu and J. Sun	Data-driven diffraction imaging of fractures using passive seismic data
	10:45 am	SI 6: Thin Bed and Facies Inversion	R. Zhang and S. Fomel	Time-variant wavelet extraction with spectral decomposition for seismic inversion

Research Highlights

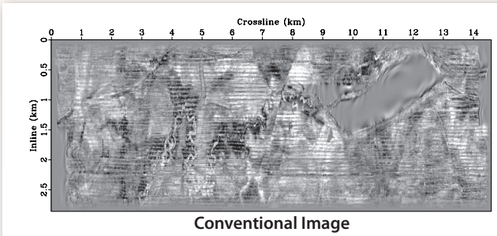
Junzhe Sun has been working on 3D anisotropic reverse-time migration (RTM) using low-rank one-step wave extrapolation. The method has remarkable numerical stability and is free from dispersion artifacts. The 3D RTM image of the SEAM Phase 1 model is generated on the Lonestar 5 supercomputer at the Texas Advanced Computing Center. A total of 196 shots were used in this example.



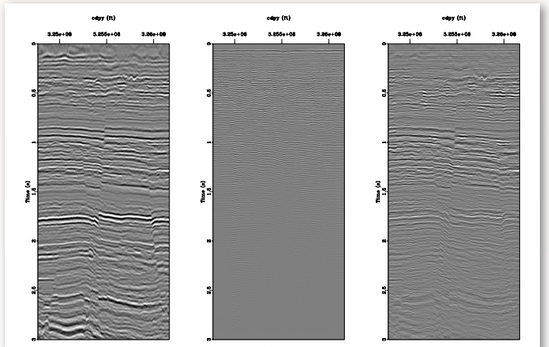
Xinming Wu has been working on methods to estimate orientations of seismic stratigraphic and structural features and use the orientations as guidance in image processing and geophysical inversion. Red segments in (a) represent seismic stratigraphic orientations, which are directly estimated from the 3D seismic image without picking horizons. These estimated orientations are useful to enhance and extract seismic stratigraphic features such as the channels in (c) from a 3D seismic image in (b).



Dmitrii Merzlikin has developed a new tool for diffraction imaging: Azimuthal Plane-Wave Destruction imaging workflow. Conventional and azimuthal plane-wave destruction images of a P-cable dataset acquired in the Gulf of Mexico are shown. The technique highlights subtle discontinuity features associated with edge diffractions, which correspond to channels and faults and determine their orientation. The workflow has a high computation efficiency: it is easy to parallelize and can be applied in target-oriented fashion.



Sarah Greer has been working on a method to match and blend multiple datasets from the same subsurface to produce an optimized third dataset. While the initial "legacy" dataset has good reflection continuity at depth and a narrow frequency bandwidth with a lower dominant frequency, the initial "high resolution" dataset has a broader frequency bandwidth with a higher dominant frequency but lacks reflection continuity at depth. This method involves first aligning the datasets before merging them to produce an ideal third dataset, which has a broad bandwidth containing both low and high frequencies, as well as shallow and deep coverage.



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Papers Accepted and Published 2015–2016

http://www.beg.utexas.edu/tccs/pubs.php

Accepted

J. M. Carcione, T. Zhu, S. Picotti, and D. Gei, 2016, Imaging septaria geobody in the Boom Clay using a Q-compensated reverse-time migration: Netherlands Journal of Geosciences, accepted.
Y. Chen, D. Zhang, Z. Jin, X. Chen, S. Zu, W. Huang, and S. Gan, 2016, Simultaneous denoising and reconstruction of 5D seismic data via damped rank-reduction method: Geophysical Journal International, accepted.
D. Merzlikin and S. Fomel, 2016, Analytical path-integral imaging of seismic diffractions: Geophysics, accepted.
S. Qu, H. Zhou, R. Liu, Y. Chen, S. Zu, S. Yu, J. Yuan, Y. Yang, 2016, Deblending of simultaneous-source seismic data using fast iterative shrinkage-thresholding algorithm with firm-thresholding: Acta Geophysica, accepted.
A. Stovas and S. Fomel, 2016, The modified generalized moveout approximation, a new parameter selection: Geophysical Prospecting, accepted.

Published 2016

M. Bai, X. Chen, J. Wu, G. Liu, Y. Chen, H. Chen, and Q. Li, 2016, Q-compensated migration by Gaussian beam summation method: Journal of Geophysics and Engineering, v. 13, 25–48.
Y. Chen, 2016, Dip-separated structural filtering using seislet transform and adaptive empirical mode decomposition based dip filter: Geophysical Journal International, v. 206, 457–469.
Y. Chen, W. Huang, D. Zhang, and W. Chen, 2016, An open-source Matlab code package for improved rank-reduction 3D seismic data denoising and reconstruction: Computers & Geosciences, v. 95, 59–66.
Y. Chen and Z. Jin, 2016, Simultaneously removing noise and increasing resolution of seismic data using waveform shaping: IEEE Geoscience and Remote Sensing Letters, v. 13, 102–104
Y. Chen, J. Ma, and S. Fomel, 2016, Double sparsity dictionary for seismic noise attenuation: Geophysics, v. 81, V17–V30
P. Deng, Y. Chen, Y. Zhang, and H.-W. Zhou, 2016, Weighted stacking of seismic AVO data using hybrid AB semblance and local similarity: Journal of Geophysics and Engineering, v. 13, 152–163.
M. Far and B. Hardage, 2016, Fracture characterization using converted waves: Geophysical Prospecting, v. 64, 287–298.
S. Gan, S. Wang, Y. Chen, and X. Chen, 2016, Simultaneous-source separation using iterative seislet-frame thresholding: IEEE Geoscience and Remote Sensing Letters, v. 13, 197–201.
S. Gan, S. Wang, Y. Chen, X. Chen, W. Huang, and H. Chen, 2016, Compressive sensing for seismic data reconstruction via fast projection onto convex sets based on seislet transform: Journal of Applied Geophysics, v. 130, 194–208.
S. Gan, S. Wang, Y. Chen, X. Chen, and K. Xian, 2016, Separation of simultaneous sources using a structural-oriented median filter in the flattened dimension: Computers & Geosciences, v. 86, 46-54.
S. Gan, S. Wang, Y. Chen, J. Chen, W. Zhong, and C. Zhang, 2016, Improved random noise attenuation using f-x empirical mode decomposition and local similarity: Applied Geophysics, v. 13, 127–134.
S. Gan, S. Wang, Y. Chen, S. Qu, S. Zu, 2016, Velocity analysis of simultaneous-source data using high-resolution semblance—coping with the strong noise: Geophysical Journal International, v. 204, 768–779.
W. Huang, R. Wang, Y. Chen, H. Li, and S. Gan, 2016, Damped multichannel singular spectrum analysis for 3D random noise attenuation: Geophysics, v. 81, V261–V270.
Y. Lee and B. Engquist, 2016, Multiscale numerical methods for passive advection–diffusion in incompressible turbulent flow fields: Journal of Computational Physics, v. 317, 33–46.
H. Li, R. Wang, S. Cao, Y. Chen, and W. Huang, 2016, A method for low-frequency noise suppression based on mathematical morphology in microseismic monitoring: Geophysics, v. 81, V159–V167.
H. Li, R. Wang, S. Cao, Y. Chen, N. Tian, and X. Chen, 2016, Weak signal detection using multiscale morphology in microseismic monitoring: Journal of Applied Geophysics, v. 133, 39-49.
W. Liu, S. Cao, Y. Chen, and S. Zu, 2016, An effective approach to attenuate random noise based on compressive sensing and curvelet transform: Journal of Geophysics and Engineering, v. 13, 135–145.
W. Liu, S. Gao, and Y. Chen, 2016, Seismic time–frequency analysis via empirical wavelet transform: IEEE Geoscience and Remote Sensing Letters, v. 13, 28–32.
W. Liu, S. Gao, Y. Liu, and Y. Chen, 2016, Synchrosqueezing transform and its application in seismic data analysis: Journal of Seismic Exploration, v. 25, 27–44.
Y. Sripanich and S. Fomel, 2016, Theory of interval traveltime parameter estimation in layered anisotropic media: Geophysics, v. 81, C253–C263.
A. Stovas and S. Fomel, 2016, Mapping of moveout attributes using local slopes: Geophysical Prospecting, v. 64, 31–37.
J. Sun, S. Fomel, and L. Ying, 2016, Lowrank one-step wave extrapolation for reverse-time migration: Geophysics, v. 81, S39–S54.
J. Sun, S. Fomel, T. Zhu, and J. Hu, 2016, Q-compensated least-squares reverse-time migration using lowrank one-step wave extrapolation: Geophysics, v. 81, S271–S279.
J. Wu, R. Wang, Y. Chen, Y. Zhang, S. Gan, and C. Zhou, 2016, Multiple attenuation using shaping regularization with seislet domain sparsity constraint: Journal of Seismic Exploration, v. 25, 1–9.
Y. Xue, J. Yang, J. Ma, and Y. Chen, 2016, Amplitude-preserving nonlinear adaptive multiple attenuation using the high-order sparse Radon transform: Journal of Geophysics and Engineering, v. 13, 207–219.
Z. Xue, Y. Chen, S. Fomel, and J. Sun, 2016, Imaging incomplete data and simultaneous-source data using least-squares reverse-time migration with shaping regularization: Geophysics, v. 81, S11–S20.
D. Zhang, Y. Chen, W. Huang, and S. Gan, 2016, Multi-step damped multichannel singular spectrum analysis for simultaneous reconstruction and denoising of 3D seismic data: Journal of Geophysics and Engineering, v. 13, 704–720.
H. Zhu and S. Fomel, 2016, Building good starting models for full waveform inversion using adaptive matching filter: Geophysics,v. 81, U61–U72.
H. Zhu, S. Li, S. Fomel, G. Stadler, and O. Ghattas, 2016, A Bayesian approach to estimate uncertainty for full-waveform inversion using a priori information from depth migration: Geophysics, v. 81, R307–R323.
T. Zhu, 2016, Implementation aspects of attenuation compensation in reverse-time migration: Geophysical Prospecting, v. 64, 657–670.
T. Zhu, J. Carcione, and M. Botelho, 2016, Reverse-time imaging of ground-penetrating radar and SH-seismic data including the effects of wave loss: Geophysics, v. 81, H21–H32.
S. Zu, H. Zhou, Y. Chen, S. Qu, X. Zou, H. Chen, and R. Liu, 2016, A periodically varying code for improving deblending of simultaneous sources in marine acquisition: Geophysics, v. 81, V213–V225.

Published 2015

T. Alkhalifah, S. Fomel, and Z. Wu, 2015, Source-receiver two-way wave extrapolation for prestack exploding-reflector modeling and migration: Geophysical Prospecting, v. 63, 23–34.
W. Burnett, A. Klokov, S. Fomel, R. Bansal, E. Liu, and T. Jenkinson, 2015, Seismic diffraction interpretation at Piceance Creek: Interpretation, v. 3, SF1–SF14.
Y. Chen, 2015, Deblending using a space-varying median filter: Exploration Geophysics: v. 46, 332–341.
Y. Chen, 2015, Iterative deblending with multiple constraints based on shaping regularization: IEEE Geoscience and Remote Sensing Letters, v. 12, 2247–2251.
Y. Chen and S. Fomel, 2015, Random noise attenuation using local signal-and-noise orthogonalization: Geophysics, v. 80, WD1-WD9.
Y. Chen, S. Gan, T. Liu, J. Yuan, Y. Zhang, and Z. Jin, 2015, Random noise attenuation by a selective hybrid approach using f-x empirical mode decomposition: Journal of Geophysics and Engineering, v. 12, 12–25.
Y. Chen, S. Gan, S. Qu, and S. Zu, 2015, Sparse inversion for water bubble removal and spectral enhancement: Journal of Applied Geophysics, v. 117, 81-90.
Y. Chen, S. Jiao, J. Ma, H. Chen, Y. Zhou, and S. Gan, 2015, Ground-roll noise attenuation using a simple and effective approach based on local band-limited orthogonalization: IEEE Geoscience and Remote Sensing Letters, v. 12, 2316–2320.
Y. Chen, Z. Jin, K. Xiang, M. Bai, and W. Huang, 2015, Iterative deblending using shaping regularization with a combined PNMO-MF-FK coherency filter: Journal of Applied Geophysics, v. 122, 18–27.
Y. Chen, T. Liu, and X. Chen, 2015, Velocity analysis using similarity-weighted semblance: Geophysics, v. 80, A75–A82.
Y. Chen, J. Yuan, S. Zu, S. Qu, and S. Gan, 2015, Seismic imaging of simultaneous-source data using constrained least-squares reverse time migration: Journal of Applied Geophysics, v. 114, 32–35.
Y. Chen, G. Zhang, S. Gan, and C. Zhang, 2015, Enhancing seismic reflections using empirical mode decomposition in the flattened domain: Journal of Applied Geophysics, v. 119, 99–105.
Y. Chen, L. Zhang, and L. Mo, 2015, Seismic data interpolation using nonlinear shaping regularization: Journal of Seismic Exploration, v. 24, 327–342.
L. Decker, X. Janson, and S. Fomel, 2015, Carbonate reservoir characterization using seismic diffraction imaging: Interpretation, v. 3, SF21–SF30.
B. Engquist, B. Froese, and R. Tsai, 2015, Fast sweeping methods for hyperbolic systems of conservation laws at steady state II: Journal of Computational Physics, v. 286, 70–86.
I. Figueiredoa, S. Kumar, C. Oliveira, J. Ramos, and B. Engquist, 2015, Automated lesion detectors in retinal fundus images: Computers in Biology and Medicine, v. 66, 47–65.
S. Fomel, 2015, Reproducible research as a community effort: Lessons from the Madagascar project: Computing in Science and Engineering, v. 17, 20–26.
S. Gan, Y. Chen, S. Zu, S. Qu, and W. Zhong, 2015, Structure-oriented singular value decomposition for random noise attenuation of seismic data: Journal of Geophysics and Engineering, v. 12, 262–272.
S. Gan, S. Wang, Y. Chen, Y. Zhang, and Z. Jin, 2015, Dealiased seismic data interpolation using seislet transform with low-frequency constraint: IEEE Geoscience and Remote Sensing Letters, v. 12, 2150–2154.
J. Hu, S. Fomel, and L. Ying, 2015, A fast algorithm for 3D azimuthally anisotropic velocity scan: Geophysical Prospecting, v. 63, 368–377.
J. Hu and L. Ying, 2015, A fast algorithm for the energy space boson Boltzmann collision operator: Mathematics of Computation, v. 84, 271–288.
S. Jiao, Y. Chen, M. Bai, W. Yang, E. Wang, and S. Gan, 2015, Ground roll attenuation using non-stationary matching filtering: Journal of Geophysics and Engineering, v. 12, 922–933.
P. Karimi, 2015, Structure-constrained relative acoustic impedance using stratigraphic coordinates: Geophysics, v. 80, A63–A67.
P. Karimi and S. Fomel, 2015, Stratigraphic coordinates: a coordinate system tailored to seismic interpretation: Geophysical Prospecting, v. 63, 1246–1255.
P. Karimi, S. Fomel, L. Wood, and D. Dunlap, 2015, Predictive coherency: Interpretation, v. 3, SAE1–SAE7.
S. Li and S. Fomel, 2015, A robust approach to time-to-depth conversion and interval velocity estimation from time migration in the presence of lateral velocity variations: Geophysical Prospecting, v. 63, 315–337.
Y. Liu, S. Fomel, and C. Liu, 2015, Signal and noise separation in prestack seismic data using velocity-dependent seislet transform: Geophysics, v. 80, WD117–WD128.
S. Qu, H. Zhou, Y. Chen, S. Yu, H. Zhang, J. Yuan, Y. Yang, and M. Qin, 2015, An effective method for reducing harmonic distortion in correlated vibroseis data: Journal of Applied Geophysics, v. 115, 120–128.
Y. Sripanich and S. Fomel, 2015, On anelliptic approximations for qP velocities in transversely isotropic and orthorhombic media: Geophysics, v. 80, C89–C105.
J. Sun, T. Zhu, and S. Fomel, 2015, Viscoacoustic modeling and imaging using low-rank approximation: Geophysics, v. 80, A103–A108.
Q. Xu, K. Wang, C. Medina, and B. Engquist, 2015, A mathematical model to predict adiabatic temperatures from isothermal heat evolutions with validation for cementitious materials: International Journal of Heat and Mass Transfer, v. 89, 333–338.
P. Yang and S. Fomel, 2015, Seislet-based morphological component analysis using scale-dependent exponential shrinkage: Journal of Applied Geophysics, v. 118, 66–74.
W. Yang, R. Wang, J. Wu, Y. Chen, S. Gan, and W. Zhong, 2015, An efficient and effective common reflection surface stacking approach using local similarity and plane-wave flattening: Journal of Applied Geophysics, v. 117, 67–72.
W. Yang, R. Wang, Y. Chen, J. Wu, S. Qu, J. Yuan, and S. Gan, 2015, Application of spectral decomposition using regularized non-stationary autoregression to random noise attenuation: Journal of Geophysics and Engineering, v. 12, 175–187.
H. Zhu, E. Bozdag, and J. Tromp, 2015, Seismic structure of the European crust and upper mantle based on adjoint tomography: Geophysical Journal International, v. 201, 18–52.
T. Zhu, 2015, Viscoelastic time-reversal imaging: Geophysics, v. 80, A45–A50.
T. Zhu and J. M. Harris, 2015, Application of boundary-preserving seismic inversion for delineating reservoir boundaries and zone of CO2 saturation: Geophysics, v. 80, M33–M41.
T. Zhu and J. M. Harris, 2015, Improved seismic images by Q-compensated reverse-time migration: application to the crosswell field data, west Texas: Geophysics, v. 80, B61–B67.
T. Zhu and J. M. Harris, 2015, Estimation of P-wave velocity, S-wave velocity and attenuation factor by iterative joint inversion of crosswell seismic data: Journal of Applied Geophysics, v. 123, 71–80.