Daniel B. Peter

Assistant Professor of Geophysics
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Research Interests

COMPUTATIONAL GEOPHYSICS
Numerical methods for seismic wave propagation, applications to High-Performance Computing

GEOPHYSICAL INVERSE PROBLEMS
Waveform-based seismic adjoint tomography, validation of global and regional seismic models

Education

Swiss Federal Institute of Technology, ETH Zurich, Switzerland

Ph.D., Geophysics, Department of Earth Sciences, Institute of Geophysics, May 2008
- Thesis: *Finite-frequency effects in global seismology: forward modeling and implications on tomographic imaging*, Advisor: Prof. Domenico Giardini

Diploma, Physics, Institute for Atmospheric and Climate Science, August 1998
- Thesis: *Strategies for ensemble predictions*, Advisor: Prof. Huw C. Davies

Academic experience

King Abdullah University of Science & Technology (KAUST), Saudi Arabia

Assistant Professor, *July 2015 – today*
Assistant Professor of Geophysics in the Earth Sciences & Engineering (ErSE) Program within the Physical Sciences & Engineering (PSE) Division.
Affiliated to the Extreme Computing Research Center (ECRC).

Università della Svizzera italiana, USI Lugano, Switzerland
Swiss Federal Institute of Technology, ETH Zurich, Switzerland

Senior scientist, *September 2013 – June 2015*
research activities at the the Department of Computer Science, USI, and Institute of Geophysics, ETH Zurich:
- High-performance computing (HPC) application support for geophysics network "Solid Earth Dynamics"
- 3D multi-scale adjoint tomography
- Implementation of hardware-accelerated computing

teaching activities:
- Lecturer, "Seismology of the spherical Earth", bachelor & master level

Swiss Federal Institute of Technology, ETH Zurich, Switzerland

Research associate, *January 2013 – August 2013*
research activities at the Institute of Geophysics ETH Zurich:
- 3D adjoint tomography
- Implementation of hardware-accelerated computing

teaching activities:
- Lecturer, "Seismology of the spherical Earth", bachelor & master level

Princeton University, Princeton NJ, USA

Associate research scholar, *2011 − 2012*
Post-doctoral research associate, *2008 − 2011*
research activities accomplished at the Department of Geosciences, Princeton University:

- 3D seismic source inversion and adjoint tomography for regional events in the Middle East
- Seismic model validation for the Middle East
- Implementation of a finite-element ray tracing code for optical rays in deformable media

teaching activities accomplished:

- Assistant, "Computational geophysics", graduate level
- Assistant, "Quantitative seismology", graduate level

Seminar organizer, *2008 − 2010*
for the Department of Geosciences, Princeton University:

- Organization of the Solid-Earth brownbag seminar, weekly cycle

Swiss Federal Institute of Technology, ETH Zurich, Switzerland

Ph.D work, *2004 − 2008*
research activities accomplished at the Institute of Geophysics ETH Zurich:

- Implementation of a finite-difference software package to model the propagation of membrane waves on a spherical shell as an analogue to surface waves
- 2D and 3D sensitivity kernel computations for phase anomaly measurements of surface waves
- Administration of a Linux Beowulf research cluster and an Apple Xgrid supercomputer

Teaching activities, *2004 − 2007*
activities accomplished at the Institute of Geophysics ETH Zurich:

- Assistant, "Introduction to seismic networks", undergraduate level
- Assistant, "Geothermics", field work for undergraduate level

activities accomplished at the Kantonsschule Zug for the certificate of teaching ability:

- College teacher, "Physics", classes taught August 2006 − May 2007, college level

Diploma work, *May 1998 − October 1998*
research activities accomplished at the IACETH (Institute for Atmospheric and Climate Science, ETH Zurich):

- Implementation of a Lorenz-63 model with non-linear dynamics approaches for short- and medium range weather predictions, 6-month research work

Publications	*Articles in refereed journals, book chapters:*

2022 |

Abreu, R. **D. Peter**, Ch. Thomas, 2022. *Reduction of wind-turbine-generated seismic noise with structural measures*, Wind Energ. Sci., 7, 1227-1239 10.5194/wes-7-1227-2022

Ovcharenko, O., V. Kazei, T. Alkhalifah, **D. Peter**, 2022. *Multi-task learning for low- frequency extrapolation and elastic model building*, IEEE Transactions on Geoscience and Remote Sensing, 60, 1-17 10.1109/TGRS.2022.3185794

Chen, F., **D. Peter**, M. Ravasi, 2022. *Cycle-skipping mitigation using misfit measurements based on differentiable dynamic time warping*, Geophysics, 87(4), 1-85 10.1190/geo2021-0598.1

Urozayev, D., B. Ait-El-Fquih, I. Hoteit, **D. Peter**, 2022. *A Reduced-order Variational Bayesian Approach for Efficient Subsurface Imaging*, Geophys. J. Int. 10.1093/gji/ggab507

Ciardelli, C., E. Bozdağ, **D. Peter**, S. van der Lee, 2022. *SphGLLTools: A toolbox for visualization of large seismic model files based on 3D spectral-element meshes*, Computers & Geosciences, 10.1016/j.cageo.2021.105007

Akram, J., Y. Yan, **D. Peter**, 2022. *Comparison of hypocenter locations from the reprocessing of a downhole microseismic data set*, Geophysical Prospecting, 10.1111/1365-2478.13175

Liu, Q., S. Beller, W. Lei, **D. Peter**, Jeroen Tromp, 2022. *Pre-conditioned BFGS-based uncertainty quantification in elastic full-waveform inversion*, Geophys. J. Int., 10.1093/gji/ggab375

2021 |

Prada, M., P. Galvez, J.-P. Ampuero, V. Sallarès, C. Sánchez-Linares, J. Macías, **D. Peter**, 2021. *The Influence of Depth-Varying Elastic Properties of the Upper Plate on Megathrust Earthquake Rupture Dynamics and Tsunamigenesis*, J.G.R. Solid Earth, 10.1029/2021JB022328

Galvez, P., A. Petukhin, P. Somerville, J.-P. Ampuero, K. Miyakoshi, **D. Peter**, K. Irikura, 2021. *Multicycle Simulation of Strike-Slip Earthquake Rupture for Use in Near-Source Ground-Motion Simulations*, BSSA, 10.1785/0120210104

Chen, F., **D. Peter**, 2021. *Toward autonomous event identification in wave-equation traveltime inversion*, Geophysics, 10.1190/geo2020-0940.1

Valero Cano, E., J. Akram, **D. Peter**, 2021. *Automatic seismic phase picking based on unsupervised machine-learning classification and content information analysis*, Geophysics, 10.1190/geo2020-0308.1

Plesa, A.-C., E. Bozdag, A. Rivoldini, M. Knapmeyer, S. M. McLennan, S. Padovan, N. Tosi, D. Breuer, **D. Peter**, S. Stähler, M. A. Wieczorek, M. van Driel, A. Khan, T. Spohn, 2021. *Seismic Velocity Variations in a 3D Martian Mantle: Implications for the InSight Measurements*, J.G.R. Planets, 10.1029/2020JE006755

Espindola-Carmona, A., **D. Peter**, C. Ortiz-Aleman, 2021. *Crustal and Upper-Mantle Structure Below Central and Southern Mexico*, J.G.R. Solid Earth, 10.1029/2020JB020906

Kazei, V., O. Ovcharenko, P. Plotnitskii, **D. Peter**, X. Zhang, T. Alkhalifah, 2021. *Mapping full seismic waveforms to vertical velocity profiles by deep learning*, Geophysics, 10.1190/geo2019-0473.1

Kendall, E., A.M.G. Ferreira, S.J. Chang, M. Witek, **D. Peter**, 2021. *Constraints on the upper mantle structure beneath the Pacific from 3-D anisotropic waveform modeling*, J.G.R. Solid Earth, 10.1029/2020JB020003

2020 |

Lei, W., Y. Ruan, E. Bozdag, **D. Peter**, M. Lefebvre, D. Komatitsch, J. Tromp, J. Hill, N. Podhorszki, D. Pugmire, 2020. *Global adjoint tomography – model GLAD-M25*, Geophys. J. Int., 223 (1), 10.1093/gji/ggaa253

Izzatullah, M., **D. Peter**, S. Kabanikhin, M. Shishlenin, 2020. *Bayes Meets Tikhonov: Understanding Uncertainty Within Gaussian Framework for Seismic Inversion*, In: Advanced Methods for Processing and Visualizing the Renewable Energy. Studies in Systems, Decision and Control, Springer, 320, 10.1007/978-981-15-8606-4_8

Liu, Q., **D. Peter**, 2020. *Square-Root Variable Metric-based nullspace shuttle: a characterization of the nonuniqueness in elastic full-waveform inversion*, J.G.R. Solid Earth, 125 (2), 10.1029/2019JB018687

2019

Ovcharenko, O., V. Kazei, M. Kalita, **D. Peter**, T. Alkhalifah, 2019. *Deep learning for low-frequency extrapolation from multioffset seismic data*, Geophysics, 84 (6), R989-R1001. 10.1190/geo2018-0884.1

Akram, J., **D. Peter**, D. Eaton, 2019. *A k-mean characteristic function for optimizing short- and long-term-average-ratio-based detection of microseismic events*, Geophysics, 84 (4). 10.1190/geo2018-0484.1

Galvez, P., P. Somerville, A. Petukhin, J.P. Ampuero, **D. Peter**, 2019. *Earthquake cycle modelling of multi-segmented faults: dynamic rupture and ground motion simulations for the 1992 Mw 7.3 Landers earthquake*, Pure Appl. Geophys., 10.1007/s00024-019-02228-x

Liu, Q., **D. Peter**, 2019. *Square-Root Variable Metric based elastic full-waveform inversion – Part 2: Uncertainty estimation*, Geophys. J. Int., 218, 2, p. 1100 - 1120. 10.1093/gji/ggz137

Liu, Q., **D. Peter**, C. Tape, 2019. *Square-Root Variable Metric based elastic full-waveform inversion – Part 1: Theory and validation*, Geophys. J. Int., 218, 2, p. 1121 - 1135. 10.1093/gji/ggz188

2018

Ovcharenko, O., V. Kazei, **D. Peter**, T. Alkhalifah, 2018. *Variance-based model interpolation for improved full-waveform inversion in the presence of salt bodies*, Geophysics, 83 (5), R541-R551

Liu, Q., **D. Peter**, 2018 *One-step data-domain least-squares reverse time migration*, Geophysics, 83 (4), R361-R368

2017

Lefebvre, M., Y. Chen, W. Lei, D. Luet, Y. Ruan, J. Tromp, E. Bozdag, J. Hill, D. Komatitsch, L. Krischer, **D. Peter**, N. Podhorszki, J. Smith, 2017. *Data and Workflow Management for Exascale Global Adjoint Tomography*, Exascale Scientific Applications: Programming Approaches for Scalability, Performance, and Portability, Ed. T. Straatsma, K. Antypas and T. Williams, CRC Press

Miyoshi, T., M. Obayashi, **D. Peter**, Y. Tono and S. Tsuboi, 2017. *Adjoint tomography of the crust and upper mantle structure beneath the Kanto region using broadband seismograms*, Progress in Earth and Planetary Science, 4 (1). doi:10.1186/s40645-017-0143-8

2016

Rietmann, M., M. Grote, **D. Peter** and O. Schenk, 2016. *Newmark local time stepping on high-performance computing architectures*, J. Comput. Phys, 334, 308 - 326. doi:10.1016/j.jcp.2016.11.012.

Bozdag, E., **D. Peter**, M. Lefebvre, D. Komatitsch, J. Tromp, J. Hill, N. Podhorszki and D. Pugmire, 2016. *Global adjoint tomography: first-generation model*, Geophys. J. Int., 207 (3), 1739 - 1766. doi:10.1093/gji/ggw356

Komatitsch, D. Z. Xie, E. Bozdag, E. Sales de Andrade, **D. Peter**, Q. Liu and J. Tromp, 2016. *Anelastic sensitivity kernels with parsimonious storage for adjoint tomography and full waveform inversion*, Geophys. J. Int., 206 (3), 1467 - 1478. doi:10.1093/gji/ggw224

Tsuboi, S., K. Ando, T. Miyoshi, **D. Peter**, D. Komatitsch, and J. Tromp, 2016. *A 1.8 trillion degrees-of-freedom, 1.24 petaflops global seismic wave simulation on the K computer*, Int. J. of High Performance Computing Applications (IJHPCA), 30 (4), 411 - 422. doi:10.1177/1094342016632596.

Afanasiev, M., **D. Peter**, K. Sager, S. Simutė, L. Ermert, L. Krischer, and A. Fichtner, 2016. *Foundations for a multiscale collaborative global Earth model*, Geophys. J. Int., 204 (1), 39 - 58. doi:10.1093/gji/ggv439

2015 | Rietmann, M., **D. Peter**, O. Schenk, B. Ucar, and M. Grote, 2015. *Load-Balanced Local Time Stepping for Large-Scale Wave Propagation*, IEEE CPS. in 29th IEEE International Parallel & Distributed Processing Symposium (IPDPS), May 2015, Hyderabad, India. pp. 925 − 935.

2014 | Holtzman, B., J. Candler, M. Turk, and **D. Peter**, 2014. *Seismic Sound Lab: Sights, Sounds and Perception of the Earth as an Acoustic Space*, in Lecture Notes in Computer Science, Sound, Music, and Motion: 10th International Symposium, CMMR 2013. Volume 8905, 2014, pp. 161 − 174.

Magnoni, F., E. Casarotti, A. Michelini, A. Piersanti, D. Komatitsch, **D. Peter**, and J. Tromp, 2014. *Spectral-Element Simulations of Seismic Waves Generated by the 2009 L'Aquila Earthquake*, Bull. Seismol. Soc. Am., 104 (1), doi:10.1785/0120130106

2012 | Rietmann, M., P. Messmer, T. Nissen-Meyer, **D. Peter**, P. Basini, D. Komatitsch, O. Schenk, J. Tromp, L. Boschi and D. Giardini, 2012. *Forward and adjoint simulations of seismic wave propagation on emerging large-scale GPU architectures*, SC '12 Proceedings of the International Conference on High Performance Computing, Networking, Storage and Analysis, Article No. 38.

Zhu, H.J., E. Bozdag, **D. Peter** and J. Tromp, 2012. *Seismic wavespeed images across the Iapetus and Tornquist suture zones*, Geophys. Res. Lett., 39 (18), doi:10.1029/2012GL053053.

Zhu, H.J, E. Bozdag, **D. Peter** and J. Tromp, 2012. *Structure of the European upper mantle revealed by adjoint tomography*, Nature Geoscience, 5, 493-498, doi:10.1038/NGEO1501.

Epstein, M., **D. Peter** and M.A. Slawinski, 2012. *Combining ray-tracing techniques and finite-element modelling in deformable media*, QJMAM, 65 (1), 87-112.

2011 | **Peter, D.**, D. Komatitsch, Y. Luo, R. Martin, N. Le Goff, E. Casarotti, P. Le Loher, F. Magnoni, Q. Liu, C. Blitz, T. Nissen-Meyer, P. Basini and J. Tromp, 2011. *Forward and adjoint simulations of seismic wave propagation on unstructured hexahedral meshes*, Geophys. J. Int., 186 (2), 721-739.

Savage, B., **D. Peter**, B.M. Covellone, A.J. Rodgers and J. Tromp, 2011. *Next Generation, Waveform Based Three-Dimensional Models and Metrics to Improve Nuclear Explosion Monitoring in the Middle East*, in Proceedings: 33rd Monitoring Research Review (MRR 2011), 1-17, p. 161-167.

2010 | Tromp, J., Y. Luo, S. Hanasoge and **D. Peter**, 2010. *Noise Cross-Correlation Sensitivity Kernels*, Geophys. J. Int., 183 (2), 791-819.

Tromp, J., D. Komatitsch, V. Hjörleifsdóttir, Q. Liu, H. Zhu, **D. Peter**, E. Bozdag, D. McRitchie, P. Friberg, C. Trabant and A. Hutko, 2010. *Near real-time simulations of global CMT earthquakes*, Geophys. J. Int., 183 (1), 381-389.

Savage, B., **D. Peter**, B. Covellone, A. Rodgers and J. Tromp, 2010. *Next Generation, Waveform Based Three-Dimensional Models and Metrics to Improve Nuclear Explosion Monitoring in the Middle East*, in Proceedings: 32nd Monitoring Research Review (MRR 2010), 2-20, p. 207-213.

2009 | Savage, B., **D. Peter**, B. Covellone, A. Rodgers and J. Tromp, 2009. *Progress towards next generation, waveform based three-dimensional models and metrics to improve nuclear explosion monitoring in the Middle East*, in Proceedings: 31th Monitoring Research Review of Ground-Based Nuclear Explosion Monitoring Technologies (MRR 2009), LLNL-PROC-414451, 1-21, p. 194-200.

Peter, D., L. Boschi and J.H. Woodhouse, 2009. *Tomographic resolution of ray and finite-frequency methods: a membrane-wave investigation*, Geophys. J. Int., 177, 624-638.

2008 | **Peter, D.**, L. Boschi, F. Deschamps, B. Fry, G. Ekström and D. Giardini, 2008. *A new finite-frequency shear-velocity model of the European-Mediterranean region*, Geophys. Res. Lett., 35, L16315, doi:10.1029/2008GL034769.

2007 | **Peter, D.**, C. Tape, L. Boschi and J.H. Woodhouse, 2007. *Surface wave tomography: global membrane waves and adjoint methods*, Geophys. J. Int., 171, 1098-1117.

Boschi, L., J.-P. Ampuero, **D. Peter**, P.M. Mai, G. Soldati and D. Giardini, 2007. *Petas-cale computing and resolution in global seismic tomography*, Phys. Earth planet. Inter., doi:10.1016/j.pepi.2007.02. 011

Publications

Articles in non-refereed journals, non-refereed reports, abstracts, posters:

2022 |

Valero Cano, E., **D. Peter**, 2022. *Sensitivity of Seismic Noise Cross-correlations to the Structure Outside the Stations' Aperture*, AGU Fall Meeting 2022.

Espindola-Carmona, A., **D. Peter**, 2022. *Resolution analysis in Full Waveform Inversion*, AGU Fall Meeting 2022.

Riano Escandon, A., R. Orsvuran, A. Espindola-Carmona, Q. Huang, E. Bozdag, **D. Peter**, 2022. *An overview of global full-waveform inversion workflow*, AGU Fall Meeting 2022.

Bozdag, E., A.-C. Plesa, Q. Huang, **D. Peter**, C. Ciardelli, N. Brinkman, M. Knapmeyer, S. Ceylan, M. Wieczorek, B. Knapmeyer-Endrun, A. Rivoldini, A. Khan, B. Fernando, T. Nissen-Meyer, P. Lognonne, 2022. *Effects of 3D structure on Martian seismic waves*, Europlanet Science Congress 2022.

Plotnitskii, P., O. Ovcharenko, V. Kazei, **D. Peter**, T. Alkhalifah, 2022. *DL-fused elastic FWI: Application to marine streamer data*, SEG 2022. 10.1190/image2022-3745846.1

Espindola-Carmona, A., **D. Peter**, R. Orsvuran, E. Bozdag, F. Magnoni, A. Stallone, E. Casarotti, 2022. *Investigating trade-offs in anelastic waveform tomography for global-scale models*, EuroHPC Summit Week 2022 Conference, 10.3997/2214-4609.202112443

Chen, F., **D. Peter**, 2022. *Deconvolutional double-difference measurements for full-waveform inversion*, ArXiv, ArXiv:2201.03926

2021 |

Cano, E. V., Espindola-Carmona, A., **D. Peter**, 2021. *Adjoint tomography of the Colima Volcanic Complex using seismic ambient noise*, AGU Fall Meeting 2021.

Izzatullah, M., T. van Leeuwen, **D. Peter**, 2021. *Approximate Langevin Monte Carlo with Adaptation for Bayesian Full-Waveform Inversion*, EAGE 2021 Annual Conference & Exhibition, 10.3997/2214-4609.202112443

Ovcharenko, O., V. Kazei, **D. Peter**, T. Alkhalifah, 2021. *Transferring Elastic Low Frequency Extrapolation from Synthetic to Field Data*, EAGE 2021 Annual Conference & Exhibition, 10.3997/2214-4609.202112949

Akram, J., **D. B. Peter**, D. W. Eaton, H. Zhang, 2021. *Traveltime computation using a supervised learning approach*, SEG 2021, 10.1190/segam2021-3583890.1

Ovcharenko, O., V. Kazei, **D. Peter**, I. Silvestrov, A. Bakulin, T. Alkhalifah, 2021. *Dual-band generative learning for low-frequency extrapolation in seismic land data*, SEG 2021, 10.1190/segam2021-3579442.1

Chen, F., **D. Peter**, M. Ravasi, 2021. *Misfit functions based on differentiable dynamic time warping for waveform inversion*, SEG 2021, 10.1190/segam2021-3583403.1

Prada, M., P. Galvez, J.-P. Ampuero, V. Sallares, C. Sanchez-Linares, J. Macías, **D. Peter**, 2021. *The influence of depth-varying elastic properties of the upper plate on megathrust earthquake rupture dynamics and tsunamigenesis*, ESSOAr, 10.1002/essoar.10507023.1

Prada, M., P. Galvez, C. Sanchez-Linares, J.-P. Ampuero, V. Sallares, J. Macías, **D. Peter**, 2021. *The influence of depth-varying elastic properties in controlling the dynamic rupture of megathrust earthquakes and upper plate coseismic deformation*, EGU General Assembly 2021, EGU21-2852.

2020 |

Liu, Q., S. Beller, W. Lei, **D. Peter**, J. Tromp, 2020. *Preconditioned BFGS-based Uncertainty Quantification in elastic Full Waveform Inversion*, arXiv, arxiv.org/abs/2009.12663

Kazei, V., O. Ovcharenko, P. Plotnitskii, **D. Peter**, X. Zhang, T. Alkhalifah, 2020. *Deep Learning Tomography by Mapping Full Seismic Waveforms to Vertical Velocity Profiles*, EAGE 2020 Annual Conference & Exhibition Online. 10.3997/2214-4609.202011980

Plotnitskii, P., V. Kazei, O. Ovcharenko, **D. Peter**, T. Alkhalifah, 2020. *Extrapolation of Low Wavenumbers in FWI Gradients by a Deep Convolutional Neural Network*, EAGE 2020 Annual Conference & Exhibition Online. 10.3997/2214-4609.202011988

Ovcharenko, O., V. Kazei, P. Plotnitskiy, **D. Peter**, I. Silvestrov, A. Bakulin, T. Alkhalifah, 2020. *Extrapolating low-frequency prestack land data with deep learning*, SEG Technical Program Expanded Abstracts : 1546-1550.10.1190/segam2020-3427522.1

Kazei, V., O. Ovcharenko, P. Plotnitskii, **D. Peter**, T. Alkhalifah, I. Silvestrov, A. Bakulin, P. Zwartjes, 2020. *Elastic near-surface model estimation from full waveforms by deep learning*, SEG Technical Program Expanded Abstracts : 3872-3876. 10.1190/segam2020-w13-06.1

Galvez, P., A. Petukhin, P. Somerville, K. Miyakoshi, K. Irikura, **D. Peter**, 2020. *Heterogeneous multicycle dynamic rupture modeling for a vertical strike-slip fault*, 17th World Conference on Earthquake Engineering, Japan, Abstract A02278.

Plesa, A.-C., E. Bozdag, A. Rivoldini, M. Knapmeyer, S. McLennan, S. Padovan, N. Tosi, D. Breuer, **D. Peter**, S. Staehler, M. Wieczorek, M. van Driel, A. Khan, T. Spohn, C. Ciardelli, S. King, 2020. *Seismic Velocities Distribution in a 3D Mantle: Implications for InSight Measurements*, Earth and Space Science Open Archive, 10.1002/essoar.10504918.1

Selvadurai, P. A. , P. Galvez, P. M. Mai, S. Glaser, **D. Peter**, S. Wiemer, 2020. *Modelling precursory laboratory seismicity using a roughness-based rate- and state-dependent friction model*, Earth and Space Science Open Archive, 10.1002/essoar.10502600.1

Kendall, E., A. M. G. Ferreira, S.-J. Chang, **D. Peter**, 2020. *Constraints on the upper mantle structure beneath the Pacific from 3-D anisotropic waveform modelling*, Earth and Space Science Open Archive, 10.1002/essoar.10503174.1

2019 |

Bozdag, E., A.-C. Plesa, S. Padovan, N. Tosil, **D. Peter**, C. Ciardelli, D. Breuer, M. Knapmeyer, T. Spohn, M. Drilleau, E. Clevede, P.H. Lognonne, J. Tromp, M. Wieczorek, J. Murphy, S. King, B. Fernando, K. Leng, T. Nissen-Meyer, 2019. *Effect of thermal variations in Mars' mantle on 3D seismic wave propagation*, AGU, San Francisco, 2019.

Lei, W., Y. Ruan, E. Bozdag, **D. Peter**, M. Lefebvre, D. Komatitsch, J. Tromp, J. Hill, N. Podhorszki, D. Pugmire, 2019. *Global Adjoint Tomography–Model GLAD-M25*, AGU, San Francisco, 2019.

Orsvuran, R., E. Bozdag, **D. Peter**, 2019. *Anelastic Global Adjoint Tomography*, AGU, San Francisco, 2019.

Espindola-Carmona, A., **D. Peter**, C. Ortiz-Aleman, 2019. *Crustal and upper mantle velocity structure below Central Mexico*, AGU, San Francisco, 2019.

Galvez, P., P. Selvadurai, **D. Peter**, P.M. Mai, 2019. *Earthquake rupture modeling of rough fault in lab experiments*, AGU, San Francisco, 2019.

Ovcharenko, O., V. Kazei, **D. Peter**, T. Alkhalifah, 2019. *Style transfer for generation of realistically textured subsurface models*, SEG Technical Program Expanded Abstracts 2019, 2393 - 2397.

Valero Cano, E., J. Akram, **D. Peter**, L. Eisner, 2019. *A fuzzy c-means assisted AIC workflow for arrival picking on downhole microseismic data*, SEG Technical Program Expanded Abstracts 2019, 3056-3060. 10.1190/segam2019-3215089.1

Izzatullah, M., T. van Leeuwen, **D. Peter**, 2019. *Visualizing the misfit landscape for full waveform inversion*, SEG Technical Program Expanded Abstracts 2019, 1460-1464.

Izzatullah, M., T. van Leeuwen, **D. Peter**, 2019. *Bayesian uncertainty estimation for full waveform inversion: A numerical study*, SEG Technical Program Expanded Abstracts 2019, 1685-1689.

Liu, Q., **D. Peter**, 2019. *Characterise the Non-Uniqueness in Full-Waveform Inversion by Using the Square-Root Variable Metric Based Null-Space Shuttle*, 81th EAGE Conference and Exhibition 2019, London, UK.

Ovcharenko, O., V. Kazei, **D. Peter**, T. Alkhalifah, 2019. *Transfer learning for low frequency extrapolation from shot gathers for FWI applications*, 81th EAGE Conference and Exhibition 2019, London, UK.

Peter, D., Q. Liu, 2019. *Investigating uncertainties in sub-basalt imaging using spectral-element seismic wave simulations*, IUGG 2019, Montreal, Canada.

Peter, D., W. Lei, R. Orsvuran, E. Bozdag, J. Tromp, 2019. *Advances in seismic wave propagation simulations on hybrid HPC architectures*, PASC19, invited presentation, Zurich, Switzerland.

Peter, D., F. Chen, O. Ovcharenko, A. Espindola Carmona, Q. Liu, 2019. *Improving full-waveform inversions using spectral-element seismic wave propagation on emerging HPC architectures*, EGU, Vienna, Austria.

Liu, Q., **D. Peter**, 2019. *3D local-scale Square-Root Variable Metric based Elastic Full-Waveform Inversion & Uncertainty Estimation on a Supercomputing platform*, EGU, Vienna, Austria.

Ferreira, A., E. Kendall, S.-J. Chang, **D. Peter**, 2019. *Full-waveform modelling of 3-D seismic anisotropy at Pacific Lithosphere-astenosphere depths*, EGU, Vienna, Austria.

Plesa, A.-C., E. Bozdag, S. Padovan, N. Tosi, **D. Peter**, M. Knapmeyer, D. Breuer, T. Spohn, 2019. *Combining large-scale numerical simulations of thermal evolution and seismic wave propagation to model the interior of Mars*. EGU, Vienna, Austria.

2018

Peter, D., V. Monteiller, D. Komatitsch, M. Schirwon, M. Lefebrve, E. Bachmann, Y. Ruan, J. Tromp, E. Bozdag, Y. Chen, J. Vincent, 2018. *Assessing spectral-element seismic wave propagation on current HPC architectures*, AGU, e-poster presented in Washington, USA.

Chen, F., **D. Peter**. 2018. *A misfit function based on entropy regularized optimal transport for full-waveform inversion*, SEG Technical Program Expanded Abstracts 2018, 1314 - 1318.

Ovcharenko, O., V. Kazei, **D. Peter**, X. Zhang, T. Alkhalifah, 2018. *Low-Frequency Data Extrapolation Using a Feed-Forward ANN*, 80th EAGE Conference and Exhibition 2018, Copenhagen, Denmark

Chen, F., **D. Peter**, 2018. *Constructing Misfit Function for Full Waveform Inversion Based on Sliced Wasserstein Distance*, 80th EAGE Conference and Exhibition 2018, Copenhagen, Denmark

Liu, Q., **D. Peter**, 2018. *Square-Root Variable Metric Based Elastic Full Waveform Inversion and Its Uncertainty Estimation*, 80th EAGE Conference and Exhibition 2018, Copenhagen, Denmark

Akram, J., **D. Peter**, and D. Eaton, 2018. *A k-mean characteristic function to improve STA/LTA detection*, GeoConvention 2018, Calgary, Canada.

Ovcharenko, O., J. Akram, **D. Peter**, 2018. *Feasibility of moment tensor inversion for a single-well microseismic data using neural networks*, Geo 2018, 13th Middle East Geosciences Conference and Exhibition, Bahrain.

2017

Tromp, J., E. Bozdag, W. Lei, Y. Ruan, M. Lefebvre, R. Modrak, R. Orsvuran, J. Smith, D. Komatitsch, **D. Peter**, 2017. *Advances in Global Full Waveform Inversion*, AGU, Fall Meeting Abstracts, New Orleans, USA.

Ovcharenko, O., V. Kazei, **D. Peter** and T. Alkhalifah, 2017. *Neural network based low-frequency data extrapolation*, SEG Workshop on FWI, extended abstract, Manama, Bahrain.

Akram, J., O. Ovcharenko and **D. Peter**, 2017. *A robust neural network-based approach for microseismic event detection*, SEG Technical Program Expanded Abstracts 2017, Houston, USA, pp. 2929 - 2933, doi:10.1190/segam2017-17761195.1

Liu, Q., **D. Peter** and Y. Lu, 2017. *A fast pointwise strategy for anisotropic wave-mode separation in TI media*, SEG Technical Program Expanded Abstracts 2017, Houston, USA, pp. 447-451, doi:10.1190/segam2017-17795796.1

Ovcharenko, O., V, Kazei, **D. Peter** and T. Alkhalifah, 2017. *Variance-based Salt Body Reconstruction*, 79th EAGE Conference and Exhibition 2017 extended abstract, Paris, France. doi:10.3997/2214-4609.201700832

Pugmire, D., E. Bozdag, M. Lefebvre, J. Tromp, D. Komatitsch, **D. Peter**, N. Podhorszki, J. Hill, 2017. *Pillars of the Mantle: Imaging the Interior of the Earth with Adjoint Tomography*, Proceedings of the Practice and Experience in Advanced Research Computing (PEARC) 2017, Article No. 75, New Orleans, USA. doi:10.1145/3093338.3104170

Peter, D., M. Rietmann, P. Galvez, J.P. Ampuero, 2017. *High-resolution seismic wave propagation using local time stepping*, High Performance Computing Saudi Arabia (HPC Saudi), poster presented at KAUST, Saudi Arabia.

Peter, D., Q. Liu, D. Komatitsch, 2017. *Seismic wave propagation on emerging HPC architectures*, PASC17, invited talk in Lugano, Switzerland.

Peter, D., Q. Liu, D. Komatitsch, 2017. *Spectral-element seismic wave propagation on emerging HPC architectures*, EGU, poster presented in Vienna, Austria.

2016 | **Peter, D.**, M. Rietmann, P. Galvez, J.P. Ampuero. 2016. *High-resolution dynamic rupture simulations using local time stepping*, AGU, poster presented in San Francisco, USA.

Peter, D., B. Videau, K. Pouget, D. Komatitsch. 2016. *Seismic wave propagation and structural inversion on emerging HPC architectures*, Perspectives of GPU Computing in Science conference, poster presented in Rome, Italy.

2015 | **Peter, D.**, B. Videau, K. Pouget, D. Komatitsch. 2015. *Spectral-element Seismic Wave Propagation on CUDA/OpenCL Hardware Accelerators*, AGU, poster presented in San Francisco, USA.

Peter, D., B. Videau, K. Pouget, D. Komatitsch. 2015. *Forward and adjoint spectral-element simulations of seismic wave propagation using hardware accelerators*, PASC15, poster presented at ETH Zurich, Switzerland.

Peter, D., B. Videau, K. Pouget, D. Komatitsch. 2015. *Forward and adjoint spectral-element simulations of seismic wave propagation using hardware accelerators*, EGU, poster presented in Vienna, Austria.

2014 | **Peter, D.**, M. Rietmann, J. Charles, P. Messmer, D. Komatitsch, D. Göddeke, O. Schenk, J. Tromp, 2014. *High-performance computing of seismic wave propagation on graphic cards*, Woodhouse conference, invited poster presented at Oxford University, UK.

2013 | **Peter, D.**, M. Rietmann, P. Galvez, T. Nissen-Meyer, M. Grote, O. Schenk, 2013. *Accelerating spectral-element simulations of seismic wave propagation using local time stepping*, AGU, poster presented in San Francisco, USA.

Zhu, H., Y. Luo, E. Bozdag, **D. Peter** and J. Tromp, 2013. *Imaging Earth's interior based on adjoint methods: seismic inverse problems from continental to exploration scales*, in Proceedings of the International Petroleum Technology Conference (IPTC 2013), Vol. 3, 1774-1777.

2012 | **Peter, D.**, M. Rietmann, J. Charles, P. Messmer, D. Komatitsch, O. Schenk, J. Tromp, 2012. *Accelerating forward and adjoint simulations of seismic wave propagation on large GPU-clusters*, AGU, poster presented in San Francisco, USA.

2011 | **Peter, D.**, B. Savage, A. Rodgers, C. Morency and J. Tromp, 2011. *Adjoint tomography of the Middle East*, AGU, invited presentation, San Francisco, USA.

Peter, D., M. Rietmann, D. Komatitsch and J. Tromp, 2011. *Advances in high-performance spectral-element solvers for seismic tomography*, AGU, invited presentation, San Francisco, USA.

2010 | **Peter, D.**, B. Savage, A. Rodgers and J. Tromp, 2010. *Adjoint tomography of the Middle East*, AGU, paper presented in San Francisco, USA.

Luo, Y., H. Zhu, T. Nissen-Meyer, C. Morency, **D. Peter**, and J. Tromp, 2010. *Modeling and imaging based upon spectral-element and adjoint methods*, SEG Technical Program Expanded Abstracts 2010, 3231 - 3236, Denver, USA.

Peter, D., B. Savage, B. Covellone, A. Rodgers and J. Tromp, 2010. *Adjoint tomography of the Middle East for nuclear explosion monitoring*, QUEST workshop, poster presented in Alghero, Italy.

Peter, D., 2010. *Toward seismic adjoint tomography for local to global scale problems*, IPRPI Workshop, invited presentation, Troy, USA.

2008 | **Peter, D.**, A. Rodgers, B. Savage and J. Tromp, 2008. *Adjoint tomography for the Middle East*, AGU, paper presented in San Francisco, USA.

Savage, B., B. Covellone, **D. Peter**, A. Rodgers, and J. Tromp, 2008. *Initial steps towards next-generation, waveform-based, three-dimensional Models and Metrics to Improve Nuclear Explosion Monitoring in the Middle East*, Proceedings of the 30th Monitoring Research Review of Ground-Based Nuclear Explosion Monitoring Technologies, poster presented in Portsmouth, USA.

2007 | **Peter, D.**, L. Boschi and J.H. Woodhouse, 2007. *Surface wave tomography: where does ray theory break down on a global scale?*, AGU, paper presented in San Francisco, USA.

Peter, D., L. Boschi and Y. Capdeville, 2007. *Finite-frequency kernels for surface waves based upon adjoint methods*, SPICE workshop, paper presented in Cargèse, France.

2006 | **Peter, D.** and L. Boschi, 2006. *Surface wave tomography: membrane waves and adjoint methods*, SPICE workshop, paper presented in Kinsale, Ireland.

	INCITE, *Global adjoint tomography*, 2022. PI: J. Tromp, Co-PI: S. Jha, **D. Peter**, M. Turilli HPC award: 490k node-hours Summit system, DOE Leadership computing, Oak Ridge National Laboratory (ORNL)

PRACE, *(An)elastic Global Full-Waveform Inversion*, 2021.
PI: **D. Peter**, Co-PI: E. Bozdag, E. Casarotti
HPC award: 48.4M core-hours Marconi100 system, PRACE Call 22, CINECA, Italy

TACC, *(An)elastic global full-waveform inversion*, 2021.
PI: E. Bozdag, Co-PI: **D. Peter**
HPC award: 2.925M node-hours Frontera system, Leadership Resource Allocation (LRAC), Texas Advanced Computing Center (TACC)

INCITE, *Global adjoint tomography*, 2021.
PI: J. Tromp, Co-PI: S. Jha, **D. Peter**, M. Turilli
HPC award: 550k node-hours Summit system, DOE Leadership computing, Oak Ridge National Laboratory (ORNL)

INCITE, *Global adjoint tomography*, 2020.
PI: J. Tromp, Co-PI: E. Bozdag, **D. Peter**
HPC award: 450k node-hours Summit system, DOE Leadership computing, Oak Ridge National Laboratory (ORNL)

CRG, *Waveform and Tomographic Inversion for Natural and Induced Seismic events*, 2017 − 2020.
PI: T. Alkhalifah, Co-PI: **D. Peter**, J. Tromp, F. Simons, H. Zhang
Research grant $1,200,000, King Abdullah University of Science & Technology (KAUST)

Saudi Aramco, *Artificially intelligent 4D waveform inversion for reservoir monitoring*, 2019 − 2020.
PI: T. Alkhalifah, Co-PI: X. Zhang, **D. Peter**
Research grant $627,000, Saudi Aramco.

INCITE, *Global adjoint tomography*, 2019.
PI: J. Tromp, Co-PI: E. Bozdag, D. Komatitsch, **D. Peter**
HPC award: 700k node-hours Summit system, DOE Leadership computing, Oak Ridge National Laboratory (ORNL)

KSL, *HPC for large physics-based earthquake simulations*, 2018 − 2020.
PI: **D. Peter**, Co-PI: P. Galvez, A. Espindola Carmona, J.P. Ampuero
HPC award: 14M core-hours Shaheen system, KAUST Supercomputing Laboratory (KSL)

INCITE, *Global adjoint tomography*, 2018.
PI: J. Tromp, Co-PI: E. Bozdag, D. Komatitsch, M. Lefebvre, **D. Peter**
HPC award: 80M core-hours Titan system, DOE Leadership computing, Oak Ridge National Laboratory (ORNL)

CAAR, *Towards Exascale Seismic Imaging & Inversion*, 2018.
PI: J. Tromp, Co-PI: D. Komatitsch, **D. Peter**, M. Lefebvre, E. Bozdag, Y. Ruan
HPC award: access to Pre-Summit system, Center for Accelerated Application Readiness (CAAR), Oak Ridge National Laboratory (ORNL)

KSL, *Robust objective function and resolution investigations for seismic full-waveform inversions in complex media*, 2017–2018.
PI: **D. Peter**, Co-PI: Q. Liu, F. Chen, O. Ovcharenko
HPC award: 2M core-hours Shaheen system, KAUST Supercomputing Laboratory (KSL)

CRG, *Improving resolution and reliability analysis of seismic models of the Saudi Arabian peninsula*, 2016 − 2018.
PI: **D. Peter**
Research grant $163,000, King Abdullah University of Science & Technology (KAUST)

CHRONOS, *Global Waveform Inversion Across the Scales*, 2014 − 2017.
PI: A. Fichtner, Co-PI: **D. Peter**, O. Schenk
HPC award: 144M allocation-units Piz Daint system, Swiss National Supercomputing Centre (CSCS)

INCITE, *Global adjoint tomography*, 2017.
PI: J. Tromp, Co-PI: E. Bozdag, D. Komatitsch, M. Lefebvre, **D. Peter**
HPC award: 80M core-hours Titan system, DOE Leadership computing, Oak Ridge National Laboratory (ORNL)

KSL, *HPC for large physics-based earthquake simulations: 3D dynamic ruptures, strong ground motion and earthquakes cycles for giant earthquakes*, 2016.
PI: **D. Peter**, Co-PI: P. Galvez, J.P. Ampuero
HPC award: 2M core-hours Shaheen system, KAUST Supercomputing Laboratory (KSL)

KAUST, *Portable seismic broadband stations*, 2016.
PI: M. Mai, **D. Peter**
Hardware grant $300,000, King Abdullah University of Science & Technology (KAUST)

INCITE, *Global adjoint tomography*, 2016.
PI: J. Tromp, Co-PI: E. Bozdag, D. Komatitsch, M. Lefebvre, **D. Peter**
HPC award: 80M core-hours Titan system, DOE Leadership computing, Oak Ridge National Laboratory (ORNL)

PASC, *GeoScale: A framework for multi-scale seismic modelling and inversion*, 2013 − 2016.
PI: A. Fichtner, Co-PI: **D. Peter**, O. Schenk, T. Nissen-Meyer, M. Grote, D. Giardini
Research grant CHF 690,000, Platform for Advanced Scientific Computing (PASC), Swiss University Conference (SUC)

INCITE, *Global adjoint tomography*, 2015.
PI: J. Tromp, Co-PI: E. Bozdag, D. Komatitsch, M. Lefebvre, **D. Peter**
HPC award: 50M core-hours Titan system, DOE Leadership computing, Oak Ridge National Laboratory (ORNL)

INCITE, *Global Seismic Tomography based on Spectral-Element and Adjoint Methods*, 2014.
PI: J. Tromp, Co-PI: O. Schenk, Project Collaborators: E. Bozdag, D. Komatitsch, **D. Peter**
HPC award: 100M core-hours Titan system, DOE Leadership computing, Oak Ridge National Laboratory (ORNL)

INCITE, *Global Seismic Tomography based on Spectral-Element and Adjoint Methods*, 2013.
PI: J. Tromp, Co-PI: O. Schenk, Project Collaborators: E. Bozdag, D. Komatitsch, **D. Peter**
HPC award: 100M core-hours Titan system, DOE Leadership computing, Oak Ridge National Laboratory (ORNL)

NCAR, *Community Computational Platforms for Developing Three-Dimensional Models of Earth Structure*, 2012 − 2013.
PI: T. Jordan, Co-PI: P. Chen, Y. Cui, J. Tromp, Project Collaborators: E. Bozdag, E. Lee, P. Maechling, K. Olson, **D. Peter**, J. Shaw, C. Tape
HPC award: 7.3M core-hours Yellowstone system, Accelerated Scientific Discovery (ASD), NCAR Computational and Information Systems Laboratory (CISL).

Supervision	Armando Espindola Carmona, Ph.D. KAUST, 2017 – today.
	Eduardo Valero Cano, MS/PhD. KAUST, 2018 – today.
	Pavel Plotnitskii, Ph.D. KAUST, 2019 – today.
	Dias Urozayev, Ph.D. KAUST, 2019 – today.
	Yan Yang, Post-doctoral research KAUST, 2018 – 2022
	Fuqiang Chen, Ph.D. KAUST, 2016 – 2022.
	Oleg Ovcharenko, Ph.D. KAUST, 2016 – 2022.
	Muhammad Izzatullah, Ph.D. KAUST, 2017 – 2022.
	Percy Galvez Barron, Post-doctoral research KAUST, 2017 – 2020
	Jubran Akram, Post-doctoral research KAUST, 2016 – 2020
	Qiancheng Liu, Post-doctoral research KAUST, 2016 – 2019
	Kimberley Ponce Munoz, MS KAUST, 2018 – 2019.
	Mamoun Alghaslan, MS KAUST, 2018, Saudi Aramco.
Teaching	KAUST, *Seismic waves*, Lecturer, 2020, 2022
	KAUST, *Computational Geophysics*, Lecturer, 2016, 2017, 2018, 2019, 2020, 2021
	KAUST, *Graduate seminar*, Organizer, 2020, 2021
	KAUST, *Seismology II*, Lecturer, 2017, 2018
	ETH Zurich, *Seismology of the Spherical Earth*, Lecturer, 2013, 2014, 2015
	Princeton University, *Computational Geophysics*, Teaching Assistant, 2011, 2012
	Princeton University, *Quantitative Seismology*, Teaching Assistant, 2009
	ETH Zurich, *Introduction to seismic networks*, Teaching Assistant, 2005, 2006, 2007
	ETH Zurich, *Geothermics*, Teaching Assistant, 2004, 2005, 2006, 2007
	Kantonsschule Zug, *Physik*, College Teacher, 2006
Awards	Seismological Society of Japan (SSJ)
	Best Paper Award 2019,
	Adjoint tomography of the crust and upper mantle structure beneath the Kanto region using broadband seismograms, Progress in Earth and Planetary Science (2017) s40645-017-0143-8
	Platform for Advanced Scientific Computing (PASC)
	Best Poster Award, Solid Earth Dynamics, Conference 2015
	American Geophysical Union (AGU)
	Outstanding Student Paper Award, Fall meeting 2007
Memberships	American Geophysical Union (AGU)
	European Geosciences Union (EGU)
	Society of Exploration Geophysicists (SEG)

Professional Profile	Independent programmer with training and expertise in feed-forward backpropagation networks and genetic algorithms, 3D-visualisations of complex user interfaces and Computer Telephony Integration

Professional Profile

Independent programmer with training and expertise in feed-forward backpropagation networks and genetic algorithms, 3D-visualisations of complex user interfaces and Computer Telephony Integration

Possess solid understanding of non-linear dynamics with Runge-Kutta and finite-difference solving algorithms and Monte Carlo ensemble generation especially with consideration of probabilistic densities and singular vectors

Experienced in international projects of software development, strong team worker with troubleshooting and problem-solving skills

Professional experience

Petersvild, St.Gallen, Switzerland

Software Programmer, *2001 – 2004*
- Implemented genetic algorithms for optimisation of feed-forward backpropagation neural networks in Econophysics,
- 3D-visualisation applications for corporate communication.

Enterprise Communications AG / Ansid AG, Winterthur, Switzerland

Software Programmer, *2000 – 2001*
- Performed trouble shooting in the development of Computer Telephony Integration (CTI) software products, mainly in system-analysis and program design.
- Implemented core components and test environments.

Enterprise Communications AG, Zurich, Switzerland

Software Programmer, *1999 – 2000*
- Researched system-analysis and modelled telephony interfaces of Microsoft (TAPI) and ECMA (TSAPI).
- Analyzed and designed core modules of the application package within outsourcing projects, studied technical feasibility and controlled the implementation in collaboration with the quality management.

Additional Information

Languages:
German (mother language), English (fluent), French (fluent)

Programming & Scripting Languages:
Fortran, C/C++, CUDA, Python, Perl, Matlab, Ruby, Bash