Stephen P. Grand

Education:

Ph.D. in Geophysics, Caltech, April, 1986.
(Thesis: Mantle shear structure beneath the North American Plate)
BSc. in Physics, McGill University, 1978.

Professional Experience:

September 2011-January 2012 – Wiess Visiting Professor at Rice University
September 2004 – Present, Senior Research Scientist at Institute for Geophysics
September 1999 – Present, Professor of Geophysics at the University of Texas at Austin
January 1993 – August 1999, Associate Professor of Geophysics at the University of Texas at Austin.
January, 1993 - June, 1993, Visiting Professor of Geophysics at Caltech.
September, 1988 – present, Research Associate at the Institute for Geophysics at the University of Texas at Austin.
September, 1988 - December 1992, Assistant Professor of Geophysics at the University of Texas at Austin.
July, 1986 - August, 1988, Assistant Professor of Geophysics at the University of Illinois at Champaign-Urbana.
1979-1986, Graduate Research Assistant at Caltech, Pasadena, CA.
1982-1985, Consultant at Woodward-Clyde Consultants, Pasadena, CA.

Research Interests

Global Seismic Tomography
Upper Mantle Seismic Structure

Professional Societies:

American Geophysical Union
Geological Society of America

Professional Service:

IRIS Board of Directors (2009-2011)
Chair, Budget and Finance Committee for IRIS (2009-2011)
AGU Committee for Aki Medal recipient (2008)
AGU Committee for AGU Fellows nominations in Seismology (2008)
NSF Geophysics Program Panel (2005-2007)
NSF Southern California Earthquake Center Review Panel (2005)
IRIS Global Seismic Network standing committee member (1990-1992, 2000-2002)
Associate Editor for Reviews of Geophysics (1995-1996)
Secretary, Seismology Section of AGU (1996-1998)
Chair, Seismology Program Committee for Fall AGU Meeting (1997-1998)

Honors:

2022, Inge Lehman Medal, AGU
2013, Visiting Professor at Petroleum University of China
2011, Wiess Visiting Professor, Rice University
2008, Jackson School Research Award
2002, Visiting Professor at IPGP, Paris, June 2002.
2001, AGU Fellow

2001, College of Natural Sciences Teaching Excellence Award
1998, Visiting Professor at the University of Tokyo, Japan
1996, Houston Oil and Minerals Corporation Award for Faculty Excellence
1993, Invited as Visiting Professor at Caltech
1986, Best Student Paper in Seismology Award, Spring AGU Meeting
1983-1985, ARCS Foundation Fellowship
1979-1980, Gutenburg Fellowship at Caltech

Peer Reviewed Publications

Glisovic, P., S. P. Grand, C. Lu, A. M. Forte, and S. S. Wei. 2022. The effects of discontinuity topography in the mantle transition zone on global geodynamic observables and mantle heterogeneity, Geophys J. Int., 230, 623-642.

Grand, S. P., 2022. Recollections of my mentor, Donald V. Helmberger, Earthq Sci, 35, 14-16.

Lu*, C., A. M. Forte, N. A. Simmons, S. P. Grand, M. N. Kajan, H. Lai, and E. J. Garnero. 2020. The sensitivity of joint inversions of seismic and geodynamic data to mantle viscosity, Geophysics, Geochemistry, Geosystems, 21, d01:10.1029/2019GC008648.

Steinberger, B., P. L. Nelson*, S. P. Grand, W. Wang, 2019. Yellowstone plume conduit caused by large-scale mantle flow, Geophysics, Geochemistry, Geosystems, 20, 5896-5912 doi.org/10.1029/2019GC008490.

Lu*, C, S. P. Grand, H. Lai, E. Garnero, 2019. TX2019slab: a new P and S tomography model incorporating subducting slabs, J. Geophys. Res., 124, doi.org/10.1029/2019JB017448.

Lai, H., E. J. Garnero, S. P. Grand, R. W. Porritt, and T. W. Becker, 2019. Global travel time data set from adaptive empirical wavelet construction, Geophysics, Geochemistry, Geosystems, vol 20 issue 5, pp. 2175-2198.

Agrawal, M., J. Pulliam, M. K. Sen, and S. P. Grand, 2019. Lithospheric removal beneath the eastern flank of the Rio Grande Rift from receiver function velocity analysis, Geophysics, Geochemistry, Geosystems, vol 20 issue 2, pp. 974-991.

Tao*, K. S., S. P. Grand, F. Niu, 2018. , Seismic structure of the upper mantle beneath Eastern Asia from full waveform seismic tomography Geophysics, Geochemistry, Geosystems, 19 doi.org/10.1029/2018GC007460.

Liu*, C. & S. P. Grand, 2018. Seismic attenuation in the African LLSVP estimated from PcS phases, Earth Plan. Sci Lett., 489, 8-16.

Nelson*, P. L. & S. P. Grand, 2018. Lower-mantle plume beneath the Yellowstone Hotspot revealed by core waves, Nature Geoscience, 11, 280-284.

Tao*, K. S. P. Grand, F. Niu. 2017. Full-waveform inversion of triplicated data using a normalized-correlation-coefficient-based misfit function, Geophys. J. Int., 210, pp. 1517-1524.

Chen, H., F. Niu, M. Obayashi, S. P. Grand, H. Kawakatsu, Y. J. Chen, J. Ning, and S. Tanaka, 2017. Mantle seismic anisotropy beneath NE China and implications for the lithospheric

delamination hypothesis beneath the southern Great Xing'an range, Earth Planet Sci Lett, 471, pp. 32-41.

Zhang, F, Qingju Wu, S. P. Grand, Yonghua Li, Mengtan Gao, 2017. Seismic velocity variations beneath Central Mongolia: Evidence for Mantle Plumes? Earth Planet. Sci. Lett., 459, pp. 406-416.

Rowley, D. B., A. M. Forte, C. J. Rowan, P. Glisovic, R. Moucha, S. P. Grand, and N. A. Simmons, 2016. Kinematics and dynamics of the East Pacific Rise linked to a stable, deep-mantle upwelling, Sci. Adv., 2.

Brudzinski, M. R., K. M. Schlanser, N. J. Kelly, C. DeMets, S. P. Grand, B. Marquez-Azua, and E. Cabral-Cano, 2016. Tectonic tremor and slow slip along the northwestern section of the Mexico subduction zone, Earth Planet. Sci. Lett., 454, pp. 259-271.

Lu*, C. and S. P. Grand, 2016. The effect of subducting slabs in global shear wave tomography, Geophys. J. Int., 105, pp. 1074-1085.

Simmons, N. A., S. C. Myers, G. Johannesson, E. Matzel, and S. P. Grand, 2015, Evidence for long-lived subduction of an ancient tectonic plate beneath the southern Indian Ocean, Geophys. Res. Lett., 42, 9270–9278, doi:10.1002/2015GL066237.

Forte A.M., Simmons N.A., Grand S.P., 2015. Constraints on Seismic Models from Other Disciplines - Constraints on 3-D Seismic Models from Global Geodynamic Observables: Implications for the Global Mantle Convective Flow. In: Gerald Schubert (editor-in-chief) Treatise on Geophysics, 2nd edition, Oxford: Elsevier; pp. 853-907.

Suhardja*, S. K., S. P. Grand, D. Wilson*, M. Guzman-Speciale, J. M. Gomez-Gonzales, T. Dominguez-Reyes, J. Ni., 2015. Crust and subduction zone structure of Southwestern Mexico, J. Geophys. Res., 120, doi:10.1002/2014JB011573.

Guo, Zhen, Y. J. Chen, J. Ning, Y. Feng, S. P. Grand, F. Niu, H. Kawakatsu, S. Tanaka, M. Obayashi, and J. Ni., 2015. High resolution 3_D crustal structure beneath NE China from joint inversion of ambient noise and receiver functions using NECESSArray data, Earth Planet. Sci. Lett., 416, pp. 1-11.

Liu, Z., F. Niu, Y. J. Chen, S. Grand, H. Kawakatsu, J. Ning, S. Tanaka, M. Obayashi, and J. Ni, 2015. Receiver function images of the mantle transition zone beneath NE China: New constraints on intraplate volcanism, deep subduction and their potential link, Earth Planet. Sci. Lett., 412, pp. 101-111.

Tanaka S., H. Kawakatsu, M. Obayashi, Y. J. Chen, J. Ning, S. P. Grand, F. Niu, and J. Ni, 2015. Rapid lateral variation of P-wave velocity at the base of the mantle near the edge of the Large-Low Shear Velocity Province beneath the western Pacific, Geophys. J. Int., 200, pp. 1052-1065.

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Northwestern Pacific Region using Triplicated P Waves, J. Geophys. Res., 119, pp. 7667-7685, doi:10.1002/2014JB011161.

Tang*, Y., M. Obayashi, F. Niu, S. P. Grand, Y. J. Chen, H. Kawakatsu, S. Tanaka, J. Ning, and J F. Ni, 2014. Changbaishan volcanism in northeast China linked to subduction-induced mantle upwelling, Nature Geoscience, 7, pp. 470-475.

Tao, K. F. Niu, J. Ning, Y. J. Chen, S. Grand, H. Kawakatsu, S. Tanaka, M. Obayashi, J. Ni., 2014. Crustal structure beneath NE China imaged by NECESSArray receiver function data, Earth Planet. Sci. Lett., 398, pp. 48-57.

Wang*, Y., S. P. Grand, and Y. Tang*, 2014, Shear velocity structure and mineralogy of the transition zone beneath the East Pacific Rise, Earth Planet Sci Lett, 402, pp. 313-323.

Rowley, D. B., A. M. Forte, R. Moucha, J. X. Mitrovica, N. A. Simmons, and S. P. Grand. 2013. Dynamic Topography Change of the Eastern United States Since 3 Million Years Ago, Science, 340, pp. 1560-1563.

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Moucha, R., A. M. Forte, D. B. Rowley, J. X. Mitrovica, N. A. Simmons, and S. P. Grand, 2009, Deep mantle forces and the uplift of the Colorado Plateau, Geophys. Res. Lett., doi:10.1029/2009GL039778.

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Yang*, T., S. P. Grand, D. Wilson, M. Guzman-Speziale, J. M. Gomez-Gonzalez, T. Dominguez-Reyes, and J. Ni, 2009. Seismic structure beneath the Rivera Subduction Zone from finite frequency seismic tomography, J. Geophys. Res., 114, doi:10.1029/2008JB005830.

Wang, X., J. F. Ni, R. Aster, E. Sandvol, D. Wilson, C. Sine, S. P. Grand, and W. S. Baldridge, 2008. Shear wave splitting and mantle flow beneath the Colorado Plateau and its boundary with the Great Basin, BSSA, 98, pp. 2526-2532.

Moucha, R., A. M. Forte, J. Mitrovica, D. B. Rowley, J. X. Mitrovica, S. Quere, N. A. Simmons, and S. P. Grand, 2008. Dynamic topography and long-term sea-level variations: There is no such thing as a stable continental platform, Earth Planet. Sci. Lett., 271, pp. 101-108.

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Simmons*, N., A. Forte, and S. P. Grand, 2007, Thermochemical structure and components of the African superplume, Geophys. Res. Lett., 34, doi:10.1029/2006GL028009.

Simmons*, N., A. Forte, and S. P. Grand, 2006. Constraining mantle flow with seismic and geodynamic data: A joint approach, Earth Planet. Sci. Lett., 246, pp. 109-124.

Gao*, W., E. Matzel*, and S. P. Grand, 2006. Upper mantle seismic structure beneath eastern Mexico determined from P and S waveform inversion and its implications, J. Geophys. Res., 111, doi: 10.1029/2006JB004304.

Wilson*, D., D. Angus, J. Ni, and S. Grand, 2006. Constraints on the interpretation of S-to-P receiver functions, Geophys. J. Int., 165, pp. 969-980.

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Wilson, D., R. Aster, J. Ni, S. Grand, M. West, W. Gao*, W. S. Baldridge, and A. Sempken, 2005. Imaging the seismic structure of the crust and upper mantle beneath the Great Plains, Rio Grande Rift, and Colorado Plateau using Receiver Functions, J. Geophys. Res., 110, doi: 10.1029/2004JB003492.

West, M., W. Gao*, and S. Grand, 2004. A simple approach to the joint inversion of seismic body and surface waves applied to the southwest U.S., Geophys. Res. Lett., vol 31, doi:10.1029/2004GL020373.

Song, T. A., D. V. Helmberger, and S. P. Grand, 2004. Low velocity zone atop the 410 seismic discontinuity in the northwestern United States, Nature, vol 427, pp. 530-533.

Gao*, W., S. P. Grand, W. S. Baldridge, D. Wilson, M. West, J. F. Ni and R. Aster, 2004, Upper Mantle Convection Beneath the Central Rio Grande Rift Imaged by P and S Wave Tomography, J. Geophys. Res., doi:10.1029/2003/JB002743.

West, M., J. Ni, S. Baldridge, D. Wilson, R. Aster, W. Gao*, and S. Grand, 2004. Comparison of the uppermost mantle across the Colorado Plateau, Rio Grande rift and Great Plains from surface wave dispersion, J. Geophys. Res., doi:1029/2003/JB002575. (75 citations)

Matzel* E. and S. P. Grand, 2004. The anisotropic seismic structure of the upper mantle beneath the East European platform, J. Geophys. Res., doi:10.1029/2001/JB000623. (12 citations)

Thorne, M. S., E. J. Garnero, and S. Grand, 2004. Geographic correlation between hot spots and deep mantle lateral shear-wave velocity gradients, Phys of Earth Planet Int, 146, pp. 47-63. (79 citations)

Gok, R., J. F. Ni, M. West, E. Sandvol, D. Wilson, R. Aster, W. S. Baldridge, S. Grand, W. Gao*, F. Tillmann, and S. Semken, 2003. Shear wave splitting and mantle flow beneath LA RISTRA, Geophys. Res. Lett, DOI 10.1029/2002GL016616. (24 citations)

Wilson*, D. R. Aster, and the Ristra team, 2003. Imaging crust and upper mantle seismic structure in the southwestern United States using teleseismic receiver functions, The Leading Edge, vol. 22, pp. 232-237. (50 citations)

Grand, S. P., 2002. Mantle shear wave tomography and the fate of subducted slabs, Phil. Trans. R. Soc. Lond. A, 360, pp. 2475-2491. (427 citations)

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A. L. Lerner-Lam, A. Sheehan, S. P. Grand, E. Humphreys, K. Dueker, E. Hessler, H. Guo, D. K. Lee*, and M. Savage, 1998. Deep Structure Beneath the Southern Rocky Mountains from the Rocky Mountain Front Broadband Seismic Experiment, *Rocky Mountain Geology, **33,*** pp. 199-216.

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R. Zhou*, S. P. Grand, F. Tajima, and X.-Y. Ding* 1998. High velocity zone beneath southern Tibetan Plateau and implications for the regional mantle dynamics, in *Mantle Dynamics and Plate Interactions in East Asia*, *Geodynamics* volume **27** edited by M. J. Flower et al. pp. 25-46, AGU, Washington D.C. (1 citation)

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R. Zhou*, S. P. Grand, F. Tajima, and X. Y. Ding, 1996. High velocity zone beneath the southern Tibetan Plateau from P-wave differential travel-time data, *Geophys. Res. Lett*., **23**, pp. 25-28. (26 citations)

S. P. Grand and J. E. Vidale, 1996. Reply to "A discussion on "The 410-km depth discontinuity: A sharpness estimate from near-critical reflections"", *Geophys. Res. Lett*., **23**, pp. 2575. (0 citations)

E. Matzel*, M. K. Sen, and S. P. Grand, 1996. Evidence for anisotropy in the deep mantle beneath Alaska, *Geophys. Res. Lett*., **23**, pp. 2417-2420. (67 citations)

D. K. Lee* and S. P. Grand, 1996. Upper mantle shear structure beneath the Colorado Rocky Mountain front, *J. Geophys. Res*., **101**, pp. 22,233-22,244. (35 citations)

D. K. Lee* and S. P. Grand, 1996. Depth of the upper mantle discontinuities beneath the East Pacific Rise, *Geophys. Res. Lett*., **23**, pp. 3369-3372. (20 citations)

J. E. Vidale, X. Y. Ding* and S. P. Grand, 1995. The 410-km-depth discontinuity: a sharpness estimate from near-critical reflections, *Geophys. Res. Lett*., **22**, pp. 2557-2560. (38 citations)

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S. P. Grand, 1994. Mantle shear structure beneath the Americas and surrounding oceans, *J. Geophys. Res*., **99**, pp. 11,591-11,621. (582 citations)

X. Y. Ding* and S. P. Grand, 1994. Seismic structure of the deep Kurile subduction zone, *J. Geophys. Res*., **99**, pp. 23,767-23,786. (31 citations)

G. Nolet, S. P. Grand and B. L. N. Kennett, 1994. Seismic heterogeneity in the upper mantle, *J. Geophys. Res*., **99**, pp. 23,753-23,766. (102 citations)

X. Y. Ding* and S. P. Grand, 1993. Upper mantle Q structure beneath the East Pacific rise, *J. Geophys. Res*., **98**, pp. 1973-1985. (26 citations)

E. D. Garnero, D. V. Helmberger and S. Grand, 1993. Preliminary evidence for a lower mantle shear wave velocity discontinuity beneath the central Pacific, *Phys. Earth Planet. Int*., **79**, pp. 335-347. (47 citations)

E. D. Garnero, S. P. Grand and D. V. Helmberger, 1993. Low P-velocity at the base of the mantle, *Geophys. Res. Lett*., **20**, pp. 1843-1846. (64 citations)

E. D. Garnero, D. V. Helmberger and S. P. Grand, 1993. Constraining outermost core velocity with SmKS waves, *Geophys. Res. Lett*., **20**, pp. 2463-2466. (40 citations)

S. Y. Schwartz, T. Lay and S. P. Grand, 1991. Seismic imaging of subducted slabs: tradeoffs with deep paths and near receiver effects, *Geophys. Res. Lett*., **18**, pp. 1265-1268. (17 citations)

S. P. Grand, 1990. A possible station bias in travel time measurements reported to ISC, *Geophys. Res. Lett*., **17**, pp. 17-20. (41 citations)

S. P. Grand, 1987. Tomographic inversion for shear velocity beneath the North American plate, *J. Geophys. Res*., **92**, pp. 14,065-14,090. (237 citations)

S. P. Grand and D. V. Helmberger, 1985. Upper mantle shear structure beneath Asia from multi-bounce S waves, *Phys. Earth Planet. Int*., **41**, pp. 154-169. (21 citations)

D. V. Helmberger, G. R. Engen and S. P. Grand, 1985. Notes on wave propagation in laterally varying structure, *J. Geophys*., **58** pp. 82-91. (17 citations)

D. V. Helmberger, G. R. Engen and S. P. Grand, 1985. Upper-mantle cross-section from California to Greenland, *J. Geophys*., **58**, pp. 91-100. (26 citations)

L. J. Burdick and S. P. Grand, 1985. Estimation of t^* for Asian travel paths using sP and sS phases, in *The Vela Project*, ed. Ann Kerr, pp. 677-692.

S. P. Grand and D. V. Helmberger, 1984. Upper mantle shear structure of North America, *Geophys. J. R. astr. Soc*., **76**, pp. 399-438. (379 citations)

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J. A. Rial, S. P. Grand and D. V. Helmberger, 1984. A note on the lateral variation in upper mantle shear-wave velocity across the Alpine front, *Geophys. J. R. astr. Soc*., 77, pp. 639-655.(26 citations)

Other Publications

Lee, C. A. and S. P. Grand, 2012, The origin of volcanic activity far from plate boundaries, Nature, News and Views, 482, pp. 314-315.

J. Pulliam, S. P. Grand, Y. Xia, C. Rockett, and T. Barrington, 2010. Seismic Investigation of Edge-Driven Convection beneath the Rio Grande Rift, Insights, Earthscope News Letter, summer 2010.

C. Frohlich and S. P. Grand, 1990. The fate of subducting slabs, *Nature*, News and Views, **47**, pp. 333-334.

Reports

S. P. Grand, 2014. NorthEast China Extended Array (NECESSArray) – 3D seismic structure and high frequency regional wave propagation characteristics of the crust and upper mantle in Northeast China and Korea. AFRL Final Report.

S. P. Grand and X. Y. Ding, 1989. Determination of Q as a function of depth and tectonic province, GL-TR-89-0157, University of Illinois.

S. P. Grand, D. V. Helmberger and L. J. Burdick, 1985. Attenuation bias measurements of the Semipalatinsk and North African test sites from multiple S phases, Woodward-Clyde Consultants Technical Report, WCCP-R-85-01.

L. J. Burdick, S. P. Grand, D.V. Helmberger, T. Lay and J. A. Rial, 1983. Remote sensing of attenuation bias using SS, Woodward-Clyde Consultants Technical Report, WCCP-R-83-01.

Grants Funded

Tomographic Inversion for Mantle Shear Structure~NSF June, 1986 to June, 1988, $64,000.

Q as a Function of Depth and Tectonic Province~DARPA February, 1987 to February, 1989, $60,000.

University of Illinois Research Board for Computer Equipment February, 1987 to February, 1988, $7,000.

Tomographic Inversion for Mantle Shear Structure~NSF January, 1990 to December, 1991, $97,549.

Collaboration Array Studies of the Rocky Mountain Front~NSF January, 1990 to April, 1993, $64,195.

P-Wave Travel Time Modeling of the Kurile and Japan Subduction Zones~NSF February, 1992 to February, 1994, $81,473.

Collaboration Array Studies of the Rocky Mountain Front~NSF August, 1993 to January, 1995, $45,966.

Seismological study in the southern Eurasian collision zone~NSF (Fumiko Tajima PI, Steve Grand co-PI) June, 1993 to May, 1995, $148,676.

Tomographic inversion for mantle shear structure~NSF August, 1994 to July, 1997, $147,089.

Seismic Structure of the Transition Zone Associated with the Japanese Subduction Zones~NSF (Fumiko Tajima PI, Steve Grand co-PI) January, 1996 to December, 1997, $90,384.

CSEDI: Collaborative Research: Fine Structure of the Lower Mantle~NSF July 15, 1996 to June 30, 1998, $67,500.

Collaborative Research: Imaging of deep mantle shear structure and the outer core ~NSF June 1, 1998 to May 31, 2001, $129,532.

Collaborative Research: Colorado Plateau/ Rio Grande Rift/ Great Plains Seismic Transect~NSF January 1, 1999 to December 30, 2001, $121,586.

Comparison of observed and synthetic waveforms for seismic event location and phase association~Defense Special Weapons Agency, (Cliff Frohlich PI, Steve Grand co-PI) October 1, 1997 to September 30, 2000, $396,223.

Seismological study of the upper mantle transition zone associated with western Pacific subduction zones~NSF, (Fumiko Tajima PI, Steve Grand co-PI) August 1, 1998 to July 31, 2000, $115,087.

Collaborative Research: The African Mantle: A case study of seismic structure, composition, and dynamics, ~ NSF, October 1, 2000 to September 30, 2002., $78,966.

Determining crustal structure by waveform inversion of shear-coupled PL phases with global optimization~DOD, co-PI, PI Jay Pulliam, August 29, 2000 to August 28, 2003, $438,492.

Collaborative Research: Composition and Seismic Structure of the Mantle Transition Zone, ~NSF, September 1, 2001 to August 31, 2004, $165,000.

Mantle structure from joint inversions of seismic and geodynamic data ~NSF, July 1, 2003 to June 30, 2007, $245,000.

Collaborative Research: Mapping the Rivera Subduction Zone ~NSF, September 1, 2004 to August 31, 2008, $305,758.

Collaborative Research: Africa Array – Imaging the Africa Super Plume ~NSF, March 1, 2005 to February 29, 2008, $53,743.

Research in Mantle Structure – WMC Corporation, January 1, 2005 to December 31, 2005, $30,000.

Collaborative Research: Deep structure and processes of the Colorado Plateau and its margins ~Los Alamos National Laboratory – October 1, 2004 to September 30, 2007, $23,000.

Collaborative Research: NorthEast China Extended SeiSmic Array (NECESS Array): Deep subduction, mantle dynamics, and lithospheric evolution beneath Northeast China, ~NSF, September 1, 2007 – August 31, 2012, $440,000.

SIEDCAR: Seismic investigation of edge-driven convection associated with the Rio Grande Rift (co-PI, Jay Pulliam PI), ~Earthscope – NSF, June 1, 2008 – May 31, 2011, $481,030.

Collaborative Research: NorthEast China Extended SeiSmic Array (NECESSArray) – 3D structure and high frequency regional wave propagation characteristics of the crust and mantle in Northeast China and North Korea, ~DOD-AFRL, February 22, 2010 – February 21, 2013, $278,572.

Collaborative Research: Acquisition of equipment to upgrade and expand the AfricaArray seismic network, ~NSF Equipment, October 1, 2008 – September 30, 2012, $99,849.

Collaborative Research: Inversion of seismic and geodynamic data in regional and global mantle convection models (co-PI, Omar Ghattas PI), ~NSF, September 1, 2010 – August 31, 2014, $949,919.

Collaborative Research: Seismic investigation of slab structure and back arc volcanism in the Sea of Japan region, NSF, January 1, 2016 – December 31 2018, $271,837.

Collaborative Research: Improving seismic sampling and model resolution of the lower mantle using multi-bounce and diffracted waves, NSF, January 15, 2017 – January 14, 2019, $104,704.

Collaborative Research: Full waveform inversion for P and S seismic structure beneath Tibet, NSF, March 15, 2019 – February 28, 2022, $244,471.

Collaborative Research: Joint seismic-geodynamic constraints on deep Earth structure – Implications for mantle convection and Earth Rotation, NSF, May 1, 2019 – April 30, 2022. $171,902.

Significant Invited Lectures

Invited Lectures at Universities

"Mantle shear velocity structure beneath the Americas and surrounding oceans", University of California at Berkeley, November, 1990.

"Mantle shear velocity structure beneath the Americas and surrounding oceans", University of California at Santa Cruz, November, 1990.

"Tomographic inversion for mantle structure beneath North and South America", Washington University, St. Louis, November, 1991.

“Mantle shear structure and its relation to subduction”, Caltech, March, 1993.

"Mantle shear structure and its relation to subduction", USGS at Menlo Park, April, 1993.

"Mantle shear structure and its relation to subduction", Scripps Institute of Oceanography, May, 1993.

"Tomographic inversion for mantle structure", Harvard University, March, 1995.

"Tomographic inversion for mantle structure and its relation to mantle convection ", Rice University, September, 1995.

"Tomographic inversion for mantle structure and its relation to mantle convection ", New Mexico State University, September, 1996.

"Global seismic tomography: A snapshot of convection in the Earth", Columbia University, March, 1997.

"Global seismic tomography: A snapshot of convection in the Earth", Southern Methodist University, December, 1997.

"Global seismic tomography: A snapshot of convection in the Earth", University of Arizona, February, 1998.

"Global seismic tomography: A snapshot of convection in the Earth", Cornell University, March, 1998.

"Global seismic tomography: A snapshot of convection in the Earth", Acoustic Seminar, Engineering Mechanics, UT, April, 1998.

"Global seismic tomography: A snapshot of convection in the Earth", University of Illinois, October, 1998.

"Global seismic tomography: A snapshot of convection in the Earth", Earthquake Research Institute, University of Tokyo, January, 1999.

"Global seismic tomography: A snapshot of convection in the Earth", Arizona State University, February, 1999.

"Global seismic tomography: A snapshot of convection in the Earth", International Institute of Seismology and Earthquake Engineering, Tsukuba, Japan, March, 1999.

"Global seismic tomography: A snapshot of convection in the Earth", University of Oregon, May, 1999.

“Seismic Tomography and Past Plate Motions, Princeton University, October, 1999.

“Seismic tomography and past plate motions”, Penn State University, October 2000.

“Shear wave tomography and the fate of subducted slabs”, IPGP, Paris, France, June, 2002.

“Seismic tomography and flow in Earth’s mantle, “Frontiers in Geophysics” invited talk at Los Alamos National Lab, April, 2003.

“Upper Mantle Structure of the Western United States”, Caltech, July, 2004.

“Upper Mantle Studies Using Passive Seismic Arrays”, Rice University, October, 2004.

“Upper Mantle Studies Using Passive Seismic Arrays”, University of Quebec at Montreal, May, 2005.

“Mantle Flow Determined by Joint Seismic/Geodynamic Inversions”, University of Houston, April, 2007.

“Mantle Flow Determined by Joint Seismic/Geodynamic Inversions”, Ludwig-Maximilians-Universität München, June, 2007.

“Seismic Structure of the Rivera Subduction Zone”, UNAM at Queretero Campus, November, 2007.

“Mantle Flow Determined by Joint Seismic/Geodynamic Inversions”, University of Chicago, April, 2008.

"Small scale convection beneath the Southwestern United States: Results from the La Ristra Seismic Experiment", Texas Tech University, October, 2008.

“Large Scale Mantle Flow beneath Africa”, Council of Geosciences, South Africa, July, 2010.

“Large Scale Mantle Flow beneath Africa”, Wits University, South Africa, July, 2010.

“Global mantle flow determined by joint seismic/geodynamic inversions”, Rice University, October, 2011.

“Global mantle flow determined by joint seismic/geodynamic inversions”, Earthquake Research Institute (ERI), University of Tokyo, June, 2012.

“Global mantle flow determined by joint seismic/geodynamic inversions”, Peking University, September, 2012.

“Global mantle flow determined by joint seismic/geodynamic inversions”, Chinese Earthquake Administration Institute for Geophysics, July, 2013.

Deep subduction and mantle dynamics beneath Northeast China: Results from NECESS (NorthEast China Extended SeiSmic Array), Caltech, November, 2013.

Deep subduction and mantle dynamics beneath Northeast China: Results from NECESS (NorthEast China Extended SeiSmic Array), Institute of Crustal Dynamics, China Earthquake Administration, July, 2014.

“Global mantle flow determined by joint seismic/geodynamic inversions”, University of Illinois, October, 2014.

“Global mantle flow determined by joint seismic/geodynamic inversions”, Stony Brook University, October, 2015.

“Global mantle flow determined by joint seismic/geodynamic inversions”, Texas Geophysical Society, UT, November, 2016.

“Seismic structure of the upper mantle beneath Eastern Asia from full waveform inversion”, GFZ, Potsdam, Germany, May 2018.

“Seismic structure of the upper mantle beneath Eastern Asia from full waveform inversion”, IPGP, Paris, June 2018.

“Insights into mantle dynamics and thermos-chemical structure through joint inversions of seismic and geodynamic data”, China University of Petroleum, June, 2019.

“Seismic structure of the upper mantle beneath Eastern Asia from full waveform inversion”, Indian Institute of Science Education and Research, Kolkata, India, June 2019.

“Deep mantle plume beneath the Yellowstone Hotspot?, University of Southern California, September, 2020.

“Deep mantle plume beneath the Yellowstone Hotspot?, Caltech, February, 2021.

Invited Lectures at Symposia at Recent Meetings

"Investigating the mantle using intermediate periods", Invited talk for the Third Annual IRIS Workshop held in Hilton Head, South Carolina, March, 1990.

"Mantle shear structure from bodywave arrivals", Invited for the symposium entitled "Gilbert Symposium on Global Seismology" held at Scripps Institute in December, 1991.

"The relation between subduction history and lower mantle heterogeneity", Invited for Subduction Zone Processes session at AGU, held in San Francisco, 1992.

"Large scale upper mantle structure", Invited for the symposium entitled "Iliad Conference", held at Taos, NM in November, 1994.

"Constraints on large scale mantle structure", Invited for Gordon Conference held at Plymouth, NH in July, 1996.

"Evidence for Slabs Lying at the Base of the Mantle", Invited for Fall AGU held in San Francisco, 1996.

Discussion leader and session organiser for "Seismic Structure of the Deep Mantle", Invited for Chapman Conference on "The History and Dynamics of Global Plate Motions" held at Point Reyes, CA, in July, 1997.

"Slabs in the Lower Mantle", Invited for the OHP (Ocean Hemisphere Project) Symposium held at Tokyo, Japan in November, 1997.

"Two Barriers to Flow in the Lower Mantle", Invited for the Super Plume Conference held in Wako City, Japan, 1999.

"Two Barriers to Flow in the Lower Mantle", Invited for the IUGG Conference, Birmingham England, 1999.

Using broad band bodywaves for global tomography, REM (Reference Earth Model) Conference, Harvard University, May 2000.

Seismic Tomography and Flow in the Mantle, Invited Paper, Spring 2001 AGU.

Shear wave tomography and the fate of subducted slabs, invited talk at Royal Society symposium on Mantle Reservoirs, London, England, 2002.

Seismic tomography and flow in Earth's mantle, invited talk at Craaford Symposium in Sweden, 2002.

Joint Modeling of Seismic, Geodynamic and Mineral Physics Data: Implications for the origin of 3-D density and seismic velocity anomalies in the mantle, invited talk at Fall AGU, 2003.

Upper mantle structure beneath the Cordillera, invited plenary talk at the Backbone of the Americas GSA specialty meeting in Mendoza, Argentina, April, 2006.

Large scale mantle structure and mantle flow, invited talk at IAVCEI meeting in Guangzhou, China, May 2006.

NorthEast China Extended SeiSmic Array (NECESSArray), invited talk at the Western Pacific Geophysics Conference, Beijing, China, July, 2006.

Seismic Structure of the Rivera Subduction Zone, invited talk at Spring AGU meeting, Acapulco, Mexico, May, 2007.

Seismic Structure of the Rivera Subduction Zone, invited keynote talk at UGM meeting, Puerto Vallarta, Mexico, October, 2008.

Large scale mantle flow beneath Africa from joint inversion of seismic and geodynamic data, invited keynote address at South Atlantic Margin Processes and Links with onshore Evolution, Munich, Germany, 2009.

Crust and mantle structure beneath the Colorado Plateau, Fall AGU, 2010 (invited).

Mantle structure through joint inversions of seismic and geodynamic data, Keynote address at the International Geological Congress, Brisbane, Australia, August, 2012 (invited)

Deep subduction and mantle dynamics beneath Northeast China; Results for the NECESS project, Boulder East Asian Workshop, December, 2012 (invited)

Plumes and Drips Beneath North East China and the Western United States, Fall AGU, 2013 (invited)

Constraining mantle heterogeneities using seismic, geodynamic, and mineral physics joint inversion, Summer IUGG Congress, Prague, CZ (2015) (invited)

Seismic structure of the upper mantle beneath Eastern Asia from full waveform inversion, August Broadband Waveform Seismology Workshop, Singapore (2018) (invited)

Slab behavior beneath Eastern Asia from full waveform inversion, Fall AGU, 2018 (invited)

Progress in seismic tomography and deep mantle constraints on tectonics, invited talk at "30 years of Plates", Institute for Geophysics, UT, 2019.

Seismic structure of the upper mantle beneath Eastern Asia from full waveform inversion, Insights into mantle dynamics and thermochemical structure through joint inversions of seismic and geodynamic data – invited talks at "Linking subduction dynamics, mantle structure and surface geology" workshop at the University of Houston, February, (2020).

Insights into mantle dynamics and thermos-chemical structure through joint inversions of seismic and geodynamic data, invited talk at "Global Scale Seismic Imaging and Dynamics of the Earth's Mantle", College de France, Paris, March, (2020)

Imaging and modeling the Yellowstone Plume, Seismological Society of America Meeting, May (2020), (invited)

Professional and Public Service Activity

2019 - 2020 – University of Texas at Austin IRIS representative

2018 – Review Panel for Lawrence Livermore National Lab "GNDD Signal Propagation" program

2016 – Invited lecturer at CIDER (Cooperative Institute for Dynamic Earth Research) – June 26-July 15

2015 – External Review Committee for the Department of Geosciences at Rice University

2014 – External Review Committee for the Department of Geosciences at the University of Arizona

2012 - External Review Committee for the ARC Centre of Excellence for Core- to Crust Fluid Systems. The review was held at Macquarie University, Sydney, Australia.

2011 – External review committee for the Center of Earthquake Research and Information (CERI), University of Memphis

2009-2011 – Board of Directors for IRIS (elected position)

2008 - AGU Committee for Aki Medal recipient

2008 - AGU Committee for AGU Fellows nominations in Seismology

2008 - Breakout Chair for Transition Zone section for NSF Long Range Strategic Plan for Seismology

2005-2007 – NSF Panel for the Geophysics Program in the EAR Division.

2005 – NSF Panel for review and site visit for the Southern California Earthquake Center.

2001-2003 – Global Seismic Network Standing Committee for IRIS

1996-1998 - Secretary for the Seismology Section of the American Geophysical Union (elected position)

1997-1998 - Chair for the Seismology Section of the Fall American Geophysical Union National Meeting

1997 - PhD committee member for Sri Widiyantoro, Australian National University

1997 Discussion leader and session organizer for "Seismic Structure of the Deep Mantle", for Chapman Conference on "The History and Dynamics of Global Plate Motions" held at Point Reyes, CA.

1995-1996 - Associate Editor for Reviews of Geophysics

1992 - Special Session organizer for AGU session entitled “Subduction Zone Processes”

1990-1992 - Member of the Global Seismic Network standing committee of the Incorporated Research Institutions for Seismology

Administrative and Committee Service

College Committees

2019 – JSG Dean Search Committee

2019 – GSC membership and review policies adhoc committee

2016 - 2019 – Graduate Admissions Committee

2015 – Ad Hoc Committee for Strategic Planning for PhD Program

2015 – Interim Graduate Advisor - summer

2015 – Dean Review Committee

2014-2015 – Search Committee for Associate Dean of Research

2013-present – Executive Committee for Solid Earth & Tectonic Processes Theme

2007-2008 – Crust/Mantle/Core Theme Search Committee

2006 – Jackson School Dean Search Committee

2005-2006 – Jackson School Postdoc and Visiting Scientist Committee

2005 – Jackson School Initiative Review Committee

2005 – 2006 – Jackson School Appointments Committee

2002-2003 – Member of the College of Natural Sciences Promotion and Tenure Committee

1993-1998 - Member of the College of Natural Sciences Course and Curriculum Committee

1991 - Member of the College of Natural Sciences Computer Facilities Committee.

Department Committees

2019 – Geophysics Faculty Search Committee (Chair)

2018-2020 – Department Endowed Positions Committee

2017-2018 – Promotion Committee for Afu Lin (Chair)

2016-2017 – Lithosphere Dynamics Faculty Search Committee

2016 – Promotion Committee for John Lassiter (Chair)

2016 – 2019 – Dept Awards Committee

2016 – Adhoc Budget Council Committee for Role of Budget Council

2015 – Department Chair Search Committee

2015 – Geophysics Faculty Search Committee

2015 – Budget Council Promotion Committee for John Lassiter (Chair)

2014 – Promotion Committee for Jack Holt

2014 – 3rd Year Review Committee for Chris Omelon

2014 – Post Tenure Review Committee

2013-2014 – Geophysics Faculty Search Committee (Chair)

2013 – Budget Council Promotion Committee for Luc Lavier (Chair)

2012 – Budget Council Promotion Committee for Afu Lin

2012-2014 – Shell Chair Geophysics Search Committee (UTIG)

2012 – Adhoc budget council faculty evaluation committee

2011 – Third Year Review Committee for Afu Lin

2011 – Third Year Review Committee for Luc Lavier

2009-2011 – Chair, Department of Geological Sciences

2008- Promotion committee for Jim Gardner

2007 – Department of Geological Sciences Chair Search Committee

2007 – Promotion committee for John Lassiter

2006 – 2009 – Graduate Advisor, Chair of GSC, Chair Admissions and Support Committee

2006 – Third year review committee for John Lassiter

2004-2005 – Jackson School Implementation Committee

2003 – Geochemistry and Igneous Petrology Search Committee

2002 – Admissions and Support Committee

2002 – Teaching Evaluation Committee

2001- Geophysics Search Committee

1999 – Geophysics Search Committee

1999 – Unix Administrator Search Committee

1996-1998 - Strategic Plan Implementation Committee (Chair)

1998 - Institute for Geophysics Search Committee

1990-1998 - Member of the Undergraduate Advising and Awards Committee for the Department of Geological Sciences

1990 - Member of Subcommittee on Undergraduate Curriculum Evaluation. This subcommittee developed a new undergraduate curriculum for geology and geophysics majors. The curriculum was endorsed by the faculty in 1990.

1994 - Faculty Review Committee for the Department of Geological Sciences

1993-2000 - Member of Computer Committee for the Department of Geological Sciences

1994 - Computer Staff Search Committee

1991-1992 - Computer Director for the Department of Geological Sciences

1992 - Member of Visiting Lecturers Committee for the Department of Geological Sciences.

1992 - Member of the Joint Institute for Geophysics / Department of Geological Sciences Search Committee for the Shell Chair.

1990-1992 - Member of the Computer Committee at the Institute for Geophysics

1989-1991 - Member of Seminar Committee at the Institute for Geophysics

Undergraduate Supervision

Independent Study

Tammi Kennedy – GEO371C – Fall, 1997.

Graduate Student Supervision

Masters Thesis Supervision

1) James H. Moore, graduated fall, 1993.
Thesis title: P-Wave Travel Time Tomography in the Mantle Beneath the Indian-South Asian Collision Zone.

2) Eric Matzel, graduated spring, 1997.
Thesis title: Evidence for anisotropy in the D" layer beneath Alaska.

3) James Lundy, graduated spring, 1998.
Thesis title: Seismic Coupling Along the New Hebrides Trench.

4) Christopher Sine, graduated spring, 2007.
Thesis title: Tomographic investigation of the upper mantle velocity structure beneath the transition from the western Colorado Plateau to the Great Basin

5) Yang Wang, graduated spring, 2013.
Thesis title: Shear velocity structure and mineralogy of the transition zone beneath the East Pacific Rise

6) Xia Yu, graduated summer, 2013.
Thesis title: Dynamics of the Eastern Edge of the Rio Grande Rift

Doctoral Dissertation Supervision

1) Xiao-Yang Ding, graduated spring, 1995.
Dissertation title: Seismic Structure of the Deep Kurile Subduction Zone.

2) Duk-Kee Lee, graduated spring 1996.
Dissertation title: The Upper Mantle Structure Beneath the Rocky Mountains and the East Pacific Rise.

3) Ran Zhou (co-supervisor Fumiko Tajima), graduated spring 1996.
Dissertation Title: High Velocity Zone Beneath the Southern Tibetan Plateau and Fast Global Optimization of Earthquake Source Parameters.

4) Paul Nyffenegger (co-supervisor Cliff Frohlich), graduated fall 1998.
Dissertation Title: Aftershock Occurence Rate Decay for Individual Sequences and Catalogs

5) Brian Schlottmann, graduated Spring 2001.
Dissertation Title: A Path Integral Formulation of Elastic Wave Propagation.

6) Eric Matzel, graduated, fall 2002.
Dissertation Title: The anisotropic seismic structure of the upper mantle beneath the East European platform.

7) Gao Wei, graduated spring 2006.
Dissertation Title: Upper mantle seismic structure beneath the central Rio Grande Rift and beneath Eastern Mexico and their Implications

8) Nathan Simmons, graduated spring, 2007.
Dissertation Title: Mantle heterogeneity and flow from seismic and geodynamic constraints

9) Martin Brandt, graduated fall 2011 (Graduated from Wits University, South Africa under my supervision.
Dissertation Title: Imaging the African Superplume – Upper Mantle, Tomography and Moment Tensor

10) Sandy Suhardja, graduated fall 2013.
Dissertation Title: Mapping the Rivera and Cocos Subduction Zones

11) Chang Lu, graduated fall 2018.
Dissertation Title: Constraining Mantle Heterogeneity and Mantle Flow using Seismic and Geodynamic Data

12) Peter Nelson, graduated fall 2020. Seismic Imaging of Deep Mantle Plumes and Inner-Outer Core Boundary Heterogeneity using Core Waves

Current Students

Chujie Liu

Post-doctoral collaborators

1) Duk-Kee Lee, fall 1996.
2) Dave Wilson – 2005-2006
3) Ting Yang – 2006-2007
4) Brian Schlottman – Research Scientist – 2005
5) Youcai Tang – 2010-2012
6) Kai Tao 2014-2016
7) Petar Glisovic – Research Fellow - 2019-2020
8) Junlin Hua – 2021-present