

Jamie Farrell

Curriculum Vitae

January 2016

Present position

Jamie M. Farrell, Ph.D.
Assistant Research Professor
University of Utah Seismograph Stations
Department of Geology & Geophysics
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Education

Ph.D. in Geophysics, University of Utah, 2013
Dissertation: *Seismicity and tomographic imaging of the Yellowstone crustal magmatic-tectonic system.*
M.S. in Geophysics, University of Utah, 2007
Thesis: *Space-time seismicity and development of a geographical information system database with interactive graphics for the Yellowstone region.*
B.S. in Geology, Utah State University, 2001
Senior Thesis: *Finding the Pre-Grand Canyon Colorado River: Petrology of the Muddy Creek Formation North of Lake Mead.*

Professional Experience

Assistant Research Professor, University of Utah, 2015 - present
Postdoctoral Fellow, University of Utah, 2013-2015
Research Assistant, University of Utah, 2004-2013
Instructor, University of Utah, on Earthquakes & Volcanoes, 2006 fall semester
Teaching Assistant, University of Utah, 2002-2004
Research Assistant, Utah State University, Summer 2001

Affiliations

American Geophysical Union (AGU)
Seismological Society of America (SSA)
Geological Society of America (GSA)
American Association of Petroleum Geologists (AAPG)

Awards

Best Student Presentation: 2013 SSA National Meeting, Salt Lake City, UT
Best Student Poster: 2009 EarthScope National Meeting, Boise, ID
Utah State University Dept. of Geology 2001 Outstanding Graduating Senior
Utah State University Dept. of Geology 2000 Field Camp Scholarship recipient

Teaching Experience

Instructor

Earthquakes & Volcanoes, GEO-1030/3030, University of Utah – An intro level geology course on the occurrence, characteristics, and processes of earthquakes and volcanic eruptions on a global scale interpreted in terms of plate tectonics. Scientific and social aspects of living in earthquake and volcano country. Case histories from the western United States and elsewhere. Taught once in Fall 2006.

Teaching Assistant

Seismology I: Tectonophysics and Elastic Waves, GEO-5210/6211, University of Utah - Continuum mechanics of Earth materials, tensor formulation of deformation and stress, fracture, flow, and rheology of the Earth materials; constitutive relationships; wave propagation, wave equations, reflection/refraction, travel time determinations. Introduction to analytic problem solving using computer tools. I was a TA under Bob Smith.

Earthquake Seismology and Risk Assessment, GEO-5330/6330/7330, University of Utah – Earthquake physics and methods of earthquake hazard assessment, earthquake mechanics; wave propagation, instrumentation, surface waves, interpretation of seismograms and earthquake location methods. A special section of the course can be taken separately that focuses on earthquake risk assessment including use of fault, earthquake history, strong ground motion, attenuation, and principles of deterministic and probabilistic earthquake risk assessment. Homework will emphasize computational and interpretational methods and will require computer skills in Fortran and Matlab or Maple. I was a TA under Bob Smith.

Invited Talks for Organizations

University of Utah Vice President for Research Nakama Research Seminar (Salt Lake City, UT) – November 6, 2015

- *New Techniques to Better Understand the Yellowstone Supervolcano.*

Timpanogos Club (Salt Lake City, UT) – October 22, 2015

- *The Yellowstone Hotspot: One of the World's Largest Volcanoes.*

Geological Society of America Rocky Mtn. Section Meeting (Casper, WY) – May 21, 2015

- *Recent Discoveries of Yellowstone's Magmatic Plumbing System, Seismic Swarms, and Their Relationship to Current Deformation.*

Kamloops Exploration Group (Kamloops, B.C.) – March 5, 2015
 - *The Yellowstone Hotspot: One of the World's Largest Volcanoes*
 Bergen Student Society and Norwegian Geological Society (Bergen, Norway) – Sept. 30, 2014
 - *The Yellowstone Hotspot: One of the World's Largest Volcanoes*
 Utah State University Science Unwrapped – March 30, 2012
 - *Yellowstone Supervolcano: Myths and Realities*
 U.S.G.S. Volcano/Earthquake Science Center Seminar – March 14, 2012
 - *Yellowstone dynamics from earthquake-volcano interactions*
 Swiss Federal Institute of Technology Zurich (ETHZ) – Feb. 2012
 - *Seismicity in the Yellowstone Volcanic Region: Insights from Recent Earthquake Swarms*
 The Yellowstone Snowmobile Guides Association, West Yellowstone, MT.
 The Nature Conservancy, Flat Ranch, Island Park, ID.
 The Utah Museum of Natural History Science Movie Night, Supervolcano, Jan. 2010.
 Madison High School, Rexburg, ID, “The Year Without a Summer” and Yellowstone.

Peer reviewed publications

- J. Farrell**, R. B. Smith, W.-L. Chang, and C.M. Puskas (2016), The Mw4.8 Norris Geyser Basin earthquake of 30 March, 2014 and its relationship to crustal deformation and seismic activity of the Yellowstone volcanic system, *In Prep*.
- Huang, H.-H, F.C. Lin, B. Schmandt, **J. Farrell**, R. B. Smith, and V. Tsai (2015), The Yellowstone magmatic system from the mantle plume to the upper crust, *Science*, 348, doi:10.1126/science.aaa5648.
- Farrell, J.**, R. B. Smith, S. Husen, and T. Diehl (2014), Tomography from 26 years of seismicity revealing that the spatial extent of the Yellowstone crustal magma reservoir extends well beyond the Yellowstone caldera, *Geophys. Res. Lett.*, 41, doi:10.1002/2014GL059588.
- Massin, F., **J. Farrell**, and R. B. Smith (2013), Repeating earthquakes in the Yellowstone volcanic field: implications for rupture dynamics, ground deformation, and migration in earthquake swarms, *J. Volcanol. Geotherm. Res.*, 257, 159-173, doi: 10.1016/j.jvolgeores.2013.03.022.
- Farrell, J.**, R. B. Smith, T. Taira, W. L. Chang, and C. M. Puskas (2010), Dynamics and rapid migration of the energetic 2008-2009 Yellowstone Lake earthquake swarm, *Geophys. Res. Lett.*, 37, L19305, doi:10.1029/2010GL044605.
- Chang, W. L., R. B. Smith, **J. Farrell**, and C. M. Puskas (2010), An extraordinary episode of Yellowstone caldera uplift, 2004-2010, from GPS and InSAR observations, *Geophys. Res. Lett.*, 37, L23302, doi:10.1029/2010GL045451.

- Farrell, J.**, S. Husen, and R. B. Smith (2009), Earthquake swarm and *b*-value characterization of the Yellowstone volcano-tectonic system, *J. Volcanol. Geotherm. Res.*, 188, 260-276, doi:10.1016/j.jvolgeores.2009.08.008.
- White, B. J. P., R. B. Smith, S. Husen, **J. Farrell**, and I. Wong (2009), Seismicity and earthquake hazard analysis of the Teton-Yellowstone region, Wyoming, *J. Volcanol. Geotherm. Res.*, 188, 277-296, doi:10.1016/j.jvolgeores.2009.08.015.
- Smith, R. B., M. Jordan, B. Steinberger, C. M. Puskas, **J. Farrell**, G. P. Waite, S. Husen, W. L. Chang, and R. O'Connell (2009), Geodynamics of the Yellowstone hotspot and mantle plume: Seismic and GPS imaging, kinematics, and mantle flow, *J. Volcanol., Geotherm. Res.*, 188, 25-56, doi:10.1016/j.jvolgeores.2009.08.020.
- Chang, W. L., R. B. Smith, C. Wicks, **J. Farrell**, and C. M. Puskas (2007), Accelerated uplift and magma intrusion of the Yellowstone caldera, 2004-2006, *Science*, 318, no. 5852, 952-956.
- Velasco, A.A., C. J. Ammon, **J. Farrell**, and K. Pankow (2004), Rupture directivity of the 3 November 2002 Denali fault earthquake determined from surface waves, *Bull. Seism. Soc. Am.*, 94, no. 6B, S293-S299.

Selected Conference Abstracts

- Farrell, J.**, and F.-C. Lin (2015), Imaging the Yellowstone magmatic system using multi-component ambient noise cross-correlation and tomography, Abstract V31E-3071 presented at 2015 Fall Meeting, AGU, San Francisco, Calif., 12-16 Dec.
- Wang, Y., F.-C. Lin, and **J. Farrell**, (2015), Rayleigh wave tomography of Mount St. Helens, Washington from ambient seismic noise, Abstract S41A-2705 presented at 2015 Fall Meeting, AGU, San Francisco, Calif., 12-16 Dec.
- Farrell, J.**, and F.-C. Lin, (2015), Imaging the Yellowstone magmatic system using surface waves from ambient noise cross-correlation, 2015 EarthScope National Meeting, Stowe, VT., June 15-17.
- Farrell, J.**, R.B. Smith, H.-H Huang, F.-C. Lin, W.-C Chang, and C.M. Puskas, (2015), Recent discoveries of Yellowstone's magmatic plumbing system, seismic swarms and their relationship to current deformation, Geological Society of America, *Abstracts with Programs*, 47(6), 7.
- Farrell, J.**, R.B. Smith, D. Shelly, C.M. Puskas, and W.C. Chang (2014), The Mw4.8 Norris Geyser Basin earthquake of 30 March, 2014 and its relationship to crustal deformation and seismic activity of the Yellowstone volcanic system, Abstract S11E-4400 presented at 2014 Fall Meeting, AGU, San Francisco, Calif., 15-19 Dec.

- Farrell, J.,** Robert B. Smith, and F.-C. Lin (2014), Dynamics of the Yellowstone volcanic system using 4D seismic imaging, *Seismol. Res. Lett.*, 85(2), 479.
- Farrell, J.,** Robert B. Smith, and S. Husen (2013), The Yellowstone magma reservoir is 50% larger than previously imaged, Abstract V41B-2778 presented at 2013 Fall Meeting, AGU, San Francisco, Calif., 9-13 Dec.
- Farrell, J.,** S. Husen, and R. B. Smith (2013), Crustal Velocity Structure and Seismicity of the Yellowstone Volcanic System from Automated Waveform Analysis of Body Waves, 1984-2011, *Seismol. Res. Lett.*, 84(2), 297.
- Farrell, J.,** R. B. Smith, S. Husen (2012), Crustal velocity structure and seismicity of the Yellowstone volcanic field from automated waveform analysis of P- and S-wave data of Yellowstone earthquakes from 1984-2012, Abstract V11E-07 presented at 2012 Fall Meeting, AGU, San Francisco, Calif., 3-7 Dec.
- Farrell, J.,** R. B. Smith, F. Massin, S. Husen, R. Burlacu, K. Koper, and D. Drobeck (2011), High precision earthquake source and wave properties of the Yellowstone volcanic-tectonic system using automated seismic waveform analysis, Abstract S31B-2241 presented at 2011 Fall Meeting, AGU, San Francisco, Calif., 5-9 Dec.
- Farrell, J.,** F. Massin, R. B. Smith, B. J. P. White (2010), Persistent seismicity and energetics of the 2010 earthquake sequence of the Gros Ventre-Teton area, Wyoming, Abstract T51C-2073 presented at 2010 Fall Meeting, AGU, San Francisco, Calif., 13-17 Dec.
- Farrell, J.,** R. B. Smith, W. L. Chang, and C. M. Puskas (2009), Geodetic and seismic monitoring of Yellowstone: A living, breathing, shaking, volcano, *Eos Trans. AGU*, 90(52), Fall Meet. Suppl., Abstract V32B-02.
- Farrell, J.,** R. B. Smith, T. Taira, C. M. Puskas, R. Burlacu, J. Pechmann, H. Heasler, and J. Lowenstern (2009), The 2008-2009 intense Yellowstone Lake earthquake swarm: Magmatic origin from temporal hypocenter variations, GPS deformation, and explosive source moment tensors, *EarthScope National Meeting*, Boise, ID, May 12-15.
- Farrell, J.,** R. B. Smith, T. Taira, C. M. Puskas, R. Burlacu, J. Pechmann, H. Heasler, and J. Lowenstern (2009), Source properties and deformation analysis of the 2008-2009 Yellowstone Lake earthquake swarm, *Seismol. Res. Lett.*, 80(2), 339.
- Smith, R. B., **J. Farrell**, P. Gettings, and C. M. Puskas (2008), Temporal gravity and mass changes accompanying the 2004-2008 unprecedented uplift of the Yellowstone caldera, *Eos Trans. AGU*, 89(53), Fall Meet. Suppl., Abstract V51D-2066.

- Farrell, J., R. B. Smith, and G. P. Waite (2007)**, Temporal stress variations of the Yellowstone volcanic system: Seismic and magmatic contributions, *EarthScope National Meeting*, Monterrey, CA, March 27-30, Poster 2.
- Farrell, J., and R. B. Smith (2005)**, A geologic-GIS database for the Yellowstone-Teton volcanic and tectonic region, *Geological Society of America Abstracts with Programs*, 37, No. 7, p. 206.
- Farrell, J., and R. B. Smith (2005)**, A geologic-GIS database for the Yellowstone-Teton volcanic and tectonic region, *EarthScope in the Northern Rockies Meeting*, Bozeman, MT., Sept. 16-18.
- Farrell, J., R. B. Smith, D. Kilb, and E. Morikawa (2005)**, The Yellowstone GEO-GIS database: Facilitating integrated research and data distribution for Yellowstone geoscience, *GEON All Hands Meeting*, San Diego, CA., May 5-6.
- Farrell, J., S. Husen, and R. B. Smith (2005)**, Imaging the *b*-value distribution beneath the Yellowstone hydrothermal system, *EarthScope National Meeting*, Tamaya Resort, Santa Ana Pueblo, NM, March 28-31, Poster 058.
- Farrell, J., S. Husen, and R. B. Smith (2004)**, *b*-value mapping of the Yellowstone volcanic and hydrothermal system, *Eos Trans. AGU*, 85(47), Fall Meet. Suppl., Abstract S13A-1030.
- Farrell, J. M., G. P. Waite, R. B. Smith, C. M. Puskas, H. Heasler, B. Bartel, and C. Dietel (2003)**, Seismic and GPS monitoring of the 2003 Norris Geyser Basin hydrothermal disturbance, Yellowstone National Park, *Eos Trans. AGU*, 84(46), Fall Meet. Suppl., Abstract V31B-06.
- Farrell, J., R. B. Smith, H. M. Benz, K. L. Pankow, and S. Husen (2002)**, Amplified ground response across the western U.S. interior from the M7.9 Denali earthquake, *Eos Trans. AGU*, 83(47), Fall Meet. Suppl., Abstract S72F-1358.

Other Scientific Publications

- Farrell, J., R. Burlacu, P.M. Roberson, J.M. Hale, K.J. Goddard, G. Bobetich, A. Mokhtar, K.D. Koper, R.B. Smith, J.C. Pechmann, and K.L. Pankow (2015)**, Earthquake activity in the Yellowstone region preliminary epicenters July 1 – September 30, 2015, quarterly report of Univ. Utah Seismograph Stations, pp. 1-18.
- Farrell, J., R. Burlacu, P.M. Roberson, J.M. Hale, K.J. Goddard, K.D. Koper, R.B. Smith, J.C. Pechmann, and K.L. Pankow (2015)**, Earthquake activity in the Yellowstone region preliminary epicenters April 1 – June 30, 2014, quarterly report of Univ. Utah Seismograph Stations, pp. 1-18.

Farrell, J., R. Burlacu, P.M. Roberson, J.M. Hale, K.J. Goddard, K.D. Koper, R.B. Smith, J.C. Pechmann, and K.L. Pankow (2015), Earthquake activity in the Yellowstone region preliminary epicenters January 1 – March 31, 2015, quarterly report of Univ. Utah Seismograph Stations, pp. 1-20.

Farrell, J., R. Burlacu, P.M. Roberson, J.M. Hale, K.J. Goddard, K.D. Koper, R.B. Smith, J.C. Pechmann, and K.L. Pankow (2015), Earthquake activity in the Yellowstone region preliminary epicenters October 1 – December 31, 2014, quarterly report of Univ. Utah Seismograph Stations, pp. 1-20.

Farrell, J., R. Burlacu, P.M. Roberson, J.M. Hale, K.J. Goddard, K.D. Koper, R.B. Smith, J.C. Pechmann, and K.L. Pankow (2014), Earthquake activity in the Yellowstone region preliminary epicenters July 1 – September 30, 2014, quarterly report of Univ. Utah Seismograph Stations, pp. 1-22.

Farrell, J., R. Burlacu, P.M. Roberson, J.M. Hale, K.J. Goddard, N.S. Mohammad Jamaal, K.D. Koper, R.B. Smith, J.C. Pechmann, and K.L. Pankow (2014), Earthquake activity in the Yellowstone region preliminary epicenters April 1 – June 30, 2014, quarterly report of Univ. Utah Seismograph Stations, pp. 1-26.

Farrell, J., R. Burlacu, P.M. Roberson, J.M. Hale, N.S. Mohammad Jamaal, K.D. Koper, J.C. Pechmann, and K.L. Pankow (2014), Earthquake activity in the Yellowstone region preliminary epicenters January 1 – March 31, 2014, quarterly report of Univ. Utah Seismograph Stations, pp. 1-31.

Farrell, J., R. Burlacu, P.M. Roberson, J.M. Hale, N.S. Mohammad Jamaal, K.D. Koper, J.C. Pechmann, and K.L. Pankow (2014), Earthquake activity in the Yellowstone region preliminary epicenters October 1 – December 31, 2013, quarterly report of Univ. Utah Seismograph Stations, pp. 1-22.

Talks at National and Regional Meetings

2015 GSA Rocky Mtn. Section Meeting

Recent discoveries of Yellowstone's magmatic plumbing system, seismic swarms and their relationship to current deformation.

2014 SSA Annual Meeting

Dynamics of the Yellowstone volcanic system using 4D seismic imaging.

2013 SSA Annual Meeting

Crustal Velocity Structure and Seismicity of the Yellowstone Volcanic System from Automated Waveform Analysis of Body Waves, 1984-2011.

2012 AGU Fall Meeting

Crustal velocity structure and seismicity of the Yellowstone volcanic field from automated waveform analysis of P- and S-wave data of Yellowstone earthquakes from 1984-2012.

2009 AGU Fall Meeting

Geodetic and seismic monitoring of Yellowstone: A living, breathing, shaking volcano.

2009 GSA Rocky Mountain Section Meeting

Source properties and deformation analysis of the 2008-2009 Yellowstone Lake earthquake swarm.

2009 SSA Annual Meeting

Source properties and deformation analysis of the 2008-2009 Yellowstone Lake earthquake swarm.

2003 AGU Fall Meeting

Seismic and GPS monitoring of the 2003 Norris Geyser Basin hydrothermal disturbance, Yellowstone National Park.

Field Experience

Planned and organized GPS and gravity campaigns in Yellowstone in 2007, 2008, 2009, and 2010 where we would collect data at ~30 stations in and around Yellowstone including backcountry sites that required travel by boat/helicopter.

Aid University of Utah Seismograph Stations field engineer Dave Drobeck in routine maintenance of Yellowstone seismograph stations.

Planned and organized a focused seismic and geodetic study of the Norris Geyser Basin in Yellowstone National Park in 2003 & 2006. We installed 7 broadband seismometers and 8 GPS stations to monitor ongoing anomalous activity in the Norris Geyser Basin.

Helped Dr. Greg Waite install seismometers in and around Mt. St. Helens in 2005 during a time of unrest.

Yellowstone/Teton Field Trips Led

Geological Society of America (Yellowstone/Teton) – June, 2015

Wyoming Geological Association (Yellowstone) – Aug. 2012

Shell Oil (Tetons)

Utah State University Dept. of Geology (Yellowstone)

Yellowstone Association Institute Course (Aug. 2010)

- “The Grand Tour of Yellowstone Geology”

- 3 day course

Students Helped with Graduate Projects

Yadong Wang – Ph.D, University of Utah (Current)
Bonnie Pickering White – M.S. University of Utah
Katrina Settles DeNosaquo – M.S. University of Utah
Elena Russo – M.S. Michigan Tech

List of Collaborators

Robert B. Smith – University of Utah
Christine M. Puskas – Unavco Inc.
Wu-Lung Chang – National Central University, Taiwan
Gregory P. Waite – Michigan Tech
Fred Massin – Institut De Physique Du Globe De Paris (IPGP)
Taka’aki Taira – University of California Berkeley
Stephan Husen – Swiss Federal Institute of Technology
Tobias Diehl – Swiss Federal Institute of Technology
David Shelly – USGS
David Drobeck – University of Utah Seismograph Stations
Keith Koper – University of Utah
Hank Heasler – Yellowstone National Park
Jake Lowenstern – USGS
Fan-Chi Lin – University of Utah
Hsin-Hua Huang – University of Utah
Cliff Thurber – University of Wisconsin
Tim Masterlark – South Dakota School of Technology
Andrew Newman – Georgia Tech
Charles Meertens – Unavco Inc.
David Mencin – Unavco Inc.