

# **Jamie Farrell**

Curriculum Vitae

July 2017

## **Present position**

Jamie M. Farrell, Ph.D.  
Research Assistant Professor  
University of Utah Seismograph Stations  
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## **Education**

Ph.D. in Geophysics, University of Utah, 2014  
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**

Research Assistant 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)

## **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**

- Wang, Y., F.C. Lin, B. Schmandt, and **J. Farrell** (2017) Ambient noise tomography across Mount St. Helens using a dense seismic array, *J. Geophys. Res.*, 122, doi:10.1002/2016JB013769.
- 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.

### **In Preparation**

Wu, S.M., K.M. Ward, F.C. Lin, **J. Farrell**, M. Karplus, and R.B. Smith (2017), Subsurface imaging of the Upper Geyser Basin in Yellowstone using a large-N geophone array, *In Prep.*

**Farrell, J.**, R. B. Smith, W.-L. Chang, and C.M. Puskas (2017), 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.*

**Farrell, J.**, R. B. Smith, and F. Massin (2017), Persistent seismicity and energetics of the 2010 earthquake sequence of the Gros Ventre-Teton area, Wyoming, *In Prep.*

### **Selected Conference Abstracts**

**Farrell, J.**, F.C. Lin, A. Allam, R.B. Smith, and M. Karplus (2016), Using a large N geophone array to identify hydrothermal seismic sources in the Upper Geyser Basin of Yellowstone National Park, Abstract S53C-04 presented at 2016 Fall meeting, AGU, San Francisco, Calif., 12-16 Dec.

Smith, R.B., and **J. Farrell** (2016), The Yellowstone crustal magmatic system: what we know and what we don't know, Abstract V43G-01 presented at 2016 Fall meeting, AGU, San Francisco, Calif., 12-16 Dec.

**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.

### **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**

### 2016 AGU Fall Meeting

Using a large N geophone array to identify hydrothermal seismic sources in the Upper Geyser Basin of Yellowstone National Park

The Yellowstone crustal magmatic system: what we know and what we don't know

### 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 the seismic deployment of over 500 Nodal seismometers in and around Old Faithful, Yellowstone National Park in 2015 and 2016.

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 – Swiss Federal Institute of Technology  
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  
Marianne Karplus – University of Texas at El Paso  
Keith Koper – University of Utah  
Jeff Hungerford – Yellowstone National Park  
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.