Jessica R. Murray

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CURRENT POSITION

Research Geophysicist	*U.S. Geological Survey* *Earthquake Science Center, Menlo Park, CA*	**8/05 – present**

- *Earthquake Hazards Program Geodesy Coordinator* (2/14 – present)
  As a member of the Earthquake Hazards Program Council, advise Program leadership on geodetic research and monitoring priorities and strategies for addressing them
  Supervisors: Thomas Brocher (2/14 – 2/15), Frederick Pollitz (2/15 – present)
- *Project Chief*, Crustal Deformation (10/11 – 2/14)
  Led a group of fourteen (6 research scientists, 5 data analysts/field personnel)
  Supervisor: Keith Knudsen
- *Task Leader*, Global Positioning System data collection and analysis (8/05 – 10/11)
  Led a group of six (1 research scientist, 5 data analysts/field personnel)
  Supervisor: Wayne Thatcher

My research focus is the development of geodetically constrained crustal deformation models to illuminate underlying physical processes, improve seismic hazard assessment, and aid in rapid post-earthquake situational awareness. Of particular interest to me are aseismic processes including fault creep, postseismic deformation, and transient fault slip. Projects include imaging the spatial extent and rate of creep on faults in northern California, investigating strain partitioning between strike-slip and thrust faulting in the central California coast region, using GPS data in real time and near real time for improved earthquake response, and developing methods for automatically detecting transient deformation signals.

PREVIOUS POSITIONS

Visiting Researcher	*Earthquake Research Institute, Univ. of Tokyo* Host: Jun'ichi Fukuda	**9/11 – 11/11**
Mendenhall Postdoctoral Researcher	*U.S. Geological Survey, Menlo Park, CA* Supervisor: Wayne Thatcher	**12/03 – 8/05**

EDUCATION

Ph.D.	Geophysics, *Stanford University, Stanford, CA*	**1/04**
M.S.	Geophysics, *Stanford University, Stanford, CA*	**6/00**
A.B. with high Honors	Major: Earth Sciences, Minor: Education *Dartmouth College, Hanover, NH*	**6/96**

HONORS AND AWARDS

Citation for Excellence in Refereeing	American Geophysical Union	**2014**
Lectureship	Association for Women Geoscientists Distinguished Lecturer Program	**2012**
USGS STAR* award	for serving as Acting Project Chief	**2007**
USGS STAR award	for obtaining external funding	**2007**
USGS STAR award	for contributions to the 2004 Parkfield earthquake response	**2005**
Outstanding Student Paper Award	American Geophysical Union, Geodesy section, Fall Meeting 2002	**2003**
Stanford Graduate Fellowship	Chevron Fellow	**1998 – 2001**
Magna Cum Laude	Dartmouth College	**1996**
Phi Beta Kappa	Dartmouth College	**1996**
Upham Award	(co-recipient) for original geological research	**1996**
John Ebers Prize	for most deserving Earth Sciences student	**1996**
Presidential Scholar	designates completion of an integrated research program and graduation with honors	**1996**
Tucker Foundation Citation	for commitment to community service	**1996**
Estwing Award	for outstanding junior Earth Sciences major	**1995**
Francis L. Town Scientific Prize	for top sophomore in Earth Sciences	**1994**

**"Special Thanks for Achieving Results"*

PUBLICATIONS

Brooks, B. A., S. E. Minson, C. L. Glennie, **J. R. Murray**, K. Hudnut, T. L. Ericksen, V. Langenheim, D. Lockner, T. Dawson, A. Lutz, D. Schwartz, J. Lienkaemper, D. Zaccone, Harvesting the shallow slip history of the South Napa earthquake from laser scans of vine rows, *in review*.

Floyd, M. A., R. J. Walters, J. R. Elliott, G. J. Funning, J. L. Svarc, **J. R. Murray**, A. J. Hooper, Y. Larsen, P. Marinkovic, R. Bürgmann, I. A. Johanson, and T. J. Wright, Spatial variations in fault friction controlled by lithology, *in review*.

Murray, J. R., 2015, GPS: Applications in fault-related deformation monitoring. In Meyers, Robert (Ed.) Encyclopedia of Complexity and Systems Science, Springer New York, in press.

Lozos, J. C., R. A. Harris, **J. R. Murray**, and J. J. Lienkaemper 2015, Dynamic rupture models of earthquakes on the Bartlett Springs Fault, Northern California, Geophys. Res. Lett., 42, 4343–4349, doi:10.1002/2015GL063802.

Minson, S. E., B. A. Brooks, C. L. Glennie, **J. R. Murray**, J. O. Langbein, S. E. Owen, T. H. Heaton, R. A. Iannucci, D. L. Hauser, Crowdsourced earthquake early warning. Sci. Adv. 1, e1500036 (2015).

Barnhart,W.D., **J. R. Murray**, S-H Yun, J. L. Svarc, S. V. Samsonov, E. J. Fielding, B. A. Brooks, P. Milillo, 2015, Geodetic constraints on the August 2014 South Napa, CA earthquake, Seismol. Res. Lett., 86(2A), 335-343, doi:10.1785/0220140210.

Brocher, T.M., A. S. Baltay, J. L. Hardebeck, F. F. Pollitz, **J. R. Murray**, A. L. Llenos, D. P. Schwartz, J. L. Blair, D. J. Ponti, J. J. Lienkaemper, V. E. Langenheim, T. E. Dawson, K. W. Hudnut, D. R. Shelly, D. Dreger, J. Boatwright, B. T. Aagaard, D. J. Wald, R. M. Allen, W. D. Barnhart, K. L. Knudsen, B. A. Brooks, and K. M. Scharer, 2015, The M_w 6.0 24 August 2014 South Napa earthquake, Seismol. Res. Lett., 86(2A), 309-326, doi: 10.1785/0220150004.

Murray, J. R., S. E. Minson, and J. Svarc, 2014, Slip rates and spatially variable creep on faults of the northern San Andreas system inferred through Bayesian inversion of Global Positioning System data, J. Geophys. Res. Solid Earth, 119, doi: 10.1002/2014JB010966.

Minson, S. E., **J. R. Murray**, J. O. Langbein, and J. S. Gomberg 2014, Real-time inversions for finite fault slip models and rupture geometry based on high-rate GPS data, J. Geophys. Res. Solid Earth, 119, 3201–3231, doi:10.1002/2013JB010622.

Murray, J., R. Lohman, and D. Sandwell, 2013, Combining GPS and remotely-sensed data to characterize time-varying crustal motion, *Eos Trans. AGU*, 94, p. 309, doi: 10.1002/2013EO350006.

Battaglia, M., Cervelli, P. F., and **Murray, J. R.**, 2013, Modeling crustal deformation near active faults and volcanic centers—A catalog of deformation models: U.S. Geological Survey Techniques and Methods, book 13, chap. B1, 96 p., http://pubs.usgs.gov/tm/13/b1.

Lohman, R. and **J. Murray** 2013, The SCEC Geodetic Transient-Detection Validation Exercise, *Seismol. Res. Lett.*, 84, 419-425, doi: 10.1785/0220130041.

Battaglia, M., P. Cervelli, and **J. Murray** 2013, dMODELS: A MATLAB software package for modeling crustal deformation near active faults and volcanic centers. *J. Volcanol. Geoth. Res.*, 254, 1-4, doi:j.jvolgeores.2012.12.018.

Hammond, W. C., G. Blewitt, C. Kreemer, J. R. Murray-Moraleda, J. Svarc, 2011, Global Positioning System constraints on crustal deformation before and during the 21 February 2008 Wells, Nevada M 6.0 earthquake, in dePolo, C. M. and D. D. LaPoint, eds., The 21 February 2008 Mw 6.0 Wells, Nevada earthquake; a compendium of earthquake-related investigations prepared by the University of Nevada, Reno, Special Publication, Nevada Bureau of Mines and Geology, p. 181 – 196.

Bennington, N., C. Thurber, K. L. Feigl, and **J. Murray-Moraleda**, 2011, Aftershock Distribution as a Constraint on the Geodetic Model of Coseismic Slip for the 2004 Parkfield Earthquake, *PAGEOPH*, 168, doi: 10.1007/s00024-010-0214-x, 1553-1565.

Murray-Moraleda, J. and R. Lohman, 2010, Workshop Targets Development of Geodetic Transient Detection Methods, *Eos Trans. AGU*, 91, p 58.

Murray-Moraleda, J. and R. Simpson, 2009, Geodetically inferred coseismic and postseismic slip due to the 31 October 2007 M 5.4 Alum Rock earthquake, *Bull. Seismo. Soc. Am.*, 99, doi: 10.1785/0120090017.

Murray-Moraleda, J., 2009, GPS: Applications in crustal deformation monitoring. In Meyers, Robert (Ed.) Encyclopedia of Complexity and Systems Science, Vol 4, pp 4249-4283 Springer New York.

Murray-Moraleda, J. R., 2008, Predicted surface displacements for scenario earthquakes in the San Francisco Bay Region: U.S. Geological Survey Open-File Report 2008-1375, 39 p. and data package [http://pubs.usgs.gov/of/2008/1375/].

Pollitz, F., P. McCrory, J. Svarc, and **J. Murray**, 2008, Dislocation models of interseismic deformation in the western United States, *J. Geophys. Res.*, 113, doi:10.1029/2007JB005174.

R. W. Simpson, M. Barall, J. Langbein, **J. Murray**, and M. J. Rymer, 2006, San Andreas fault geometry in the Parkfield, California region, *Bull. Seis. Soc. Am.*, 96, doi: 10.1785/0120050824, S28-S37.

Murray, J. and J. Langbein, 2006, Slip on the San Andreas fault at Parkfield, California over two earthquake cycles and the implications for seismic hazard, *Bull. Seis. Soc. Am.*, 96, doi: 10.1785/0120050820, S283-S303.

Langbein, J., **J. Murray**, and H. A. Snyder, 2006, Coseismic and initial postseismic deformation from the 2004 Parkfield, California earthquake, observed by Global Positioning System, Electronic distance meter, creepmeters, and borehole strainmeters, *Bull. Seis. Soc. Am.*, 96, doi: 10.1785/0120050823, S304-S320.

Bakun, W. H., B. Aagaard, B. Dost, W. L. Ellsworth, J. L. Hardebeck, R. A. Harris, C. Ji, M. J. S. Johnston, J. Langbein, J. J. Lienkaemper, A. J. Michael, **J. Murray**, R. M. Nadeau, P. A. Reasenberg, M. S. Reichle, E. A. Roeloffs, A. Shakal, R. W. Simpson, and F. Waldhauser, 2005, Implications for prediction and hazard assessment from the 2004 Parkfield earthquake, *Nature*, 437, doi:10.1038/nature04067.

Murray, J. and P. Segall, 2005, Spatiotemporal evolution of a transient slip event on the San Andreas fault near Parkfield, California, *J. Geophys. Res.*, 110, B09407, doi:10.1029/2005JB003651.

Langbein, J., R. Borcherdt, D. Dreger, J. Fletcher, J. L. Hardebeck, M. Hellweg, C. Ji, M. Johnston, **J. Murray**, R. Nadeau, M. J. Rymer, and J. A. Treiman, 2005, Preliminary report on the 28 September 2004, M6.0 Parkfield, California, earthquake, *Seism. Res. Lett.*, 76, 1-17.

Battaglia M., P. Segall, **J. Murray**, P. Cervelli and J. Langbein, 2003, The mechanics of unrest at Long Valley caldera, California. 1. Modeling the geometry of the source using GPS, leveling and 2-color EDM data, *J. Volcanol. Geotherm. Res.*, 127, 195-217.

Murray, J., 2003, Spatial and temporal slip-rate variations on the San Andreas fault inferred from geodetic data and the implications for strain accumulation: Ph.D. dissertation, Stanford University, 193 pp.

Murray, J. and P. Segall, 2002, Testing time-predictable earthquake recurrence by direct measure of strain accumulation and release, *Nature*, 419, 287-291.

Murray, J., P. Segall, P. Cervelli, W. Prescott, and J. Svarc, 2001, Inversion of GPS data for spatially variable slip-rate on the San Andreas Fault near Parkfield, CA, *Geophys. Res. Lett.*, 28, 359-362.

Murray, J., P. Segall, P. Cervelli, W. Prescott, and J. Svarc, 2000, Inversion of geodetic data for spatially variable slip-rate on the San Andreas Fault near Parkfield, CA, in Proceedings of the 3rd Conference on Tectonic Problems of the San Andreas Fault

System, G. Bokelmann and R. Kovach, eds., Stanford University Publications, vol. XXI, p. 179-192.

Murray, J. and N. Oreskes, 1997, Uses and limitations of cathodoluminescence in the study of apatite paragenesis, *Economic Geology*, 92, 368-376.

FIRST-AUTHORED INVITED TALKS (CONFERENCES AND WORKSHOPS)

Murray, J. R. and S. E. Minson, 2013, The spatial relationship between aseismic and seismic slip on the San Andreas Fault near Parkfield, CA inferred from Bayesian inversion of geodetic data, Abstract G32B-01, presented at 2013 Fall Meeting, AGU, San Francisco, Calif., 9 – 13 Dec.

Murray-Moraleda, J., Z. Liu, and P. Segall, 2009, An application of Global Positioning System data from the Plate Boundary Observatory for deformation monitoring purposes, *Eos Trans. AGU, 90(52)*, Fall Meet. Suppl., Abstract U52A-01.

Murray-Moraleda, J. and R. Lohman, 2009, Automated detection and characterization of transient signals in geodetic data, a blind test, EarthScope National Meeting, Boise, ID, May 15, 2009.

Murray-Moraleda, J., A. Borsa, P. Cervelli, K. Hudnut, M. Johnston, N. King, J. Langbein, M. Lisowski, A. Miklius, M. Poland, and E. Roeloffs, 2008, Real-time Geodetic Data for Earthquake and Volcano Hazards Applications: Current and Future Activities at the U.S. Geological Survey, Eos Trans. AGU, 89(53), Fall Meet. Suppl., Abstract G43B-06.

Murray, J. and J. Langbein, 2007, San Andreas Fault slip near Parkfield: insights from the spatio-temporal characteristics of afterslip following the 2004 M6 earthquake, *Pardee Keynote Symposium*: "New Data, Models, and Concepts of the San Andreas Fault System", Geological Society of America Annual Meeting, *Abstracts with Programs - GSA*, *39*, 6, 422.

Murray-Moraleda, J. and J. Langbein, 2007, Potential uses of and requirements for real-time high-rate GPS data in earthquake response, Real-time GPS Science Requirements Meeting, Leavenworth, WA, Oct. 4-5, 2007.

Murray, J., J. Langbein, R. Jachens, and R. Simpson, 2006, The spatio-temporal evolution of afterslip following the 2004 Parkfield, California earthquake, Eos Trans. AGU, 87(52), Fall Meet. Suppl., Abstract S32A-04.

Murray, J., 2006, Bricks and Bungies, triggers and shadows or what's new in earthquake research, American Chemical Society, 232nd National Meeting, San Francisco, CA, Sept. 10-14, 2006.

Murray, J. and J. Langbein, 2006, The spatial and temporal evolution of afterslip following the 2004 Parkfield, CA Earthquake estimated from Global Positioning System data, SCEC annual meeting, Palm Springs, CA, Sept. 9-14, 2006.

Murray, J. and J. Langbein, 2005, Imaging spatial and temporal patterns of deformation at Parkfield, CA using geodetic data, UNAVCO/IRIS joint workshop, Stevenson, WA, Jun. 9-11, 2005.

Murray, J., J. Langbein, R. Simpson, and P. Segall, 2005, Slip on the San Andreas fault at Parkfield through two earthquake cycles, EarthScope National Meeting, Santa Ana Pueblo, NM, Mar. 28-31, 2005.

Murray, J., 2005, Geodetic Studies at Parkfield, Workshop on 3D seismic reflection at the SAFOD site, EarthScope National Meeting, Santa Ana Pueblo, NM, Mar. 28, 2005.

Murray, J., P. Segall, and J. Svarc, 2004, Slip in the 2004 Parkfield M6 Earthquake: Comparison With Previous Events and Implications for Earthquake Recurrence Models, Eos Trans. AGU, 85(47), Fall Meet. Suppl., Abstract S54B-03.

Murray, J., 2004, Geodetic studies of crustal deformation and the earthquake cycle at Parkfield, CA, 5th Joint Meeting of the United States – Japan Natural Resources Earthquake Research Panel, Asilomar, CA, Oct. 12-16, 2004.

Murray, J., and P. Segall, 2002, Analysis of previously unidentified transient fault slip using geodetic data, Eos Trans. AGU, 83, West. Pac. Geophys. Meet. Suppl., Abs. SE21A-06.

Murray, J., P. Segall, P. Cervelli, W. Prescott, and J. Svarc, 2000, Inferring the moment deficit rate on the San Andreas Fault near Parkfield, CA through the inversion of geodetic data, Eos Trans. AGU, 81, Fall Meet. Suppl., F1244.

INVITED SEMINARS (RESEARCH INSTITUTIONS)

Murray, J., S. Minson, and J. Svarc, Characterizing spatial patterns of aseismic slip on faults of the San Andreas system in northern and central California, Seismological Laboratory, **California Institute of Technology**, Pasadena, CA, February 21, 2014.

Murray, J., S. Minson, and J. Svarc, Spatially Variable Creep Rate on the Bartlett Springs and Maacama Faults, Northern California, Estimated via Bayesian Inversion of Global Positioning System Data, **NASA Jet Propulsion Laboratory**, Pasadena, CA, January 16, 2013.

Murray-Moraleda, J., J. Fukuda, F. McFarland, P. Segall, J. Svarc, Applications of GPS data for improving seismic hazard assessment and transient deformation detection, Research Center for Prediction of Earthquakes and Volcanic Eruptions, **Tohoku University**, Sendai, Japan, November 21, 2011.

Murray-Moraleda, J., J. Fukuda, F. McFarland, P. Segall, J. Svarc, Applications of GPS data for improving seismic hazard assessment and transient deformation detection, **National Research Institute for Earth Science and Disaster Prevention**, Tsukuba, Japan, November 11, 2011.

Murray-Moraleda, J., F. McFarland, T. Onishi, P. Segall, J. Svarc, and W. Thatcher, Applications of GPS data for improving seismic hazard assessment and transient deformation detection, Earthquake Research Institute, **University of Tokyo**, Tokyo, Japan, September 16, 2011.

Murray-Moraleda, J., F. McFarland, S. Nishenko, T. Onishi, W. Page, J. Svarc, and W. Thatcher, Geodetic estimates of crustal deformation in central and northern California, Department of Geophysics, **Stanford University**, Stanford, California, May 25, 2011.

Murray-Moraleda, J., Z. Liu, and P. Segall, Detecting transient fault slip using continuously recorded Global Positioning System data, **U. S. Geological Survey**, Menlo Park, California, January 6, 2010.

Murray-Moraleda, J. R., J. Svarc, F. McFarland, S. Nishenko, and W. Page, Geodetic estimates of creep on the Bartlett Springs fault, **Berkeley Seismological Laboratory**, Berkeley, CA, December 9, 2008.

Murray, J. and J. Langbein, Slip on the San Andreas fault at Parkfield, California over the most recent earthquake cycle and the implications for seismic hazard, **U.S. Geological Survey**, Reston Virginia, November 9, 2005.

Murray, J. R. and P. Segall, Transient fault slip on the San Andreas Fault near Parkfield, CA and its relationship to moderate seismicity, **Berkeley Seismological Laboratory**, Berkeley, CA, May 4, 2004.

Murray, J. R., P. Segall, P. Cervelli, W. Prescott, and J. Svarc, Inferring the moment deficit rate on the San Andreas fault at Parkfield, CA, **U. S. Geological Survey**, April 26, 2001.

SERVICE

Member, UNAVCO Geodetic Data Services Advisory Committee; liaison to PBO working group	1/13 – present
Member, Board of Directors, Seismological Society of America	1/12 - present
Leader, Southern California Earthquake Center Tectonic Geodesy Disciplinary Group and Member of Planning Committee	9/06 - present
Co-convener of annual workshops on geodetic studies of crustal deformation for the Southern California Earthquake Center	2008 - 2014
Member, Plate Boundary Observatory Transform Siting Working Group	12/04 – 1/09
Member, UNAVCO Education and Outreach Standing Committee	1/05 – 11/08
Co-chair, Earthquake Hazards Seminar Committee	3/05 – 9/05
Webmaster, Tectonophysics section, American Geophysical Union	11/02 – 6/05

Conference Sessions Convened

American Geophysical Union Fall Meeting, San Francisco, California

2013 - GNSS Techniques, Applications, and Real Time Uses for Natural Hazards Mitigation

2010 - Development and Testing of Methods for Detecting and Estimating Unsteady Motion in Geodetic Time Series

2009 - Real-Time GPS: Current Progress in Network Implementation and Data Analysis Strategies

- Geodetic Studies of Strike-Slip Fault Systems: Results in Light of EarthScope

- Detection and Characterization of Transient Crustal Deformation

2007 - Microns to Meters and Milliseconds to Months: Integrating High-Rate GPS, Seismic, Tilt, and Strain Data

2004 - The 2004 Parkfield Earthquake: A Late Breaking Section

International Geoscience Program (IGCP) 565 Project Workshop "Separating Hydrological and Tectonic Signals in Geodetic Observations"

Reno, Nevada, October 11-13, 2010: Session entitled "Transient tectonic and hydrological signals"

UNAVCO 2010 Science Workshop

Boulder CO, Mar. 8-11, 2010: Special Topic Session entitled "Detection, Monitoring and Modeling of Aseismic Slip Events and Transient Deformation"

Presentations and Publications for a General Audience

Quake 'n' Creep Measurements: Field trip focusing on techniques and tools for precisely measuring crustal deformation in the San Francisco Bay Area for members of the media, American Geophysical Union Fall Meeting, December 14, 2008.

Applications of the Global Positioning System for the study of crustal deformation, Lockheed Martin/Advanced Technology Center, Palo Alto, California, May 3, 2007.

Scientific Insights from the 1906 San Francisco Earthquake, Dartmouth College Alumni, Portola Valley, California, May 13, 2006.

Bricks and Bungies: triggers and shadows or what's new in earthquake research, Mills Hospital, San Mateo, California, December 4, 2006.

Murray, J., 2005, An earthquake scientist in action: Jessica Murray, In d'Alessio, M. (Ed.), Earthquake Science Explained, USGS General Interest Publication, 14 pp.

Testing time-predictable earthquake recurrence by direct measurement of strain accumulation and release, Bay Area Geophysical Society, San Ramon, CA, Nov. 21, 2002; Peninsula Geological Society, Stanford, CA, Oct. 15, 2002.