Christine M. Puskas

777 E South Temple 9C
Salt Lake City, UT 84102
www.uusatrg.utah.edu/PEOPLE/christine

(801) 581-7856 Office
(801) 521-4107 Home
c.puskas@utah.edu

Education
Ph.D. in Geophysics, University of Utah, 2009
M.S in Geophysics, University of Utah, 2000
B.S in Geology, University of Illinois Champaign-Urbana, 1994

Objective: A geophysical position where a background in geophysical modeling, data processing, and GPS studies can be applied.

Research Interests
Primary research interests are in ground deformation and forces driving deformation, and in the rheology and strength of the lithosphere. As part of this research I have done field work in Yellowstone, using campaign GPS to measure ground deformation of an active caldera and the nearby major fault zones of the Hebgen Lake fault and Teton fault. Data from Yellowstone has been compiled along with other GPS studies in the western U.S. to analyze the deformation of the Intermountain West, examining the distribution of deformation from a continuum and microplate perspective. I have modeled tectonic stresses for this region, focusing on the stresses from variations in mass in the lithosphere. More recent work has focused on detailed analysis of GPS time series for the Yellowstone and Wasatch networks, testing filters to remove seasonal deformation, identifying short-term shifts, and constructing fault slip models.

Summary of Qualifications
- Experienced using geophysical modeling and processing software.
- Familiar with GPS systems and field work.
- Focused research on regional tectonics, deformation, and seismology of the western U.S. and Yellowstone-Snake River Plain volcanic system.
- Diverse background in computers: operating systems, programming, software, graphics.

Related Skills and Experience
Research/Modeling Skills
- Currently modeling deformation across the Wasatch Front using elastic dislocations and GPS time series that are being filtered to remove seasonal signals.
- Converted GPS processing to Bernese 5.0 (from version 4.2) concomitant with updates to reference frame.
- Took over processing of continuous GPS data from Wasatch and YSRP GPS networks.
- Processed and analyzed GPS data of Yellowstone-Snake River Plain campaigns (1987, 1989, 1991, 1993, 1995, 2000, 2003) and 2003 Norris Geyser Basin GPS experiment.
- Analyzed continuum models of regional deformation in western U.S. by using a finite-element, thin sheet formulation of the lithosphere.

- Evaluated block/microplate models of regional deformation in western U.S. by solving for rotations, displacements, and internal deformation of fault-bounded blocks.
- Created stress models of body forces arising from variations of mass in the lithosphere and from the effects of the Yellowstone hotspot.
- Compared stress and deformation models through rheological analysis (average lithospheric viscosity) and through comparison of stress and strain rate tensors.
- Compiled GPS velocities, fault slip rates, earthquake slip azimuths, post-seismic viscoelastic deformation models, and crustal structure data for use in modeling.
- Analyzed deformation budget of Yellowstone volcanic field and Basin-Range by comparing energy of deformation with energy released by earthquakes.
- Examined relationships between volume changes in Yellowstone magma chamber and surface deformation due to crystallization, fluid release, and magma injection scenarios.
- Wrote program for determining crustal strength profiles based on rock type (used in Tectonophysics classes).
- Located earthquakes in Yellowstone and Utah for University of Utah Seismograph Stations.

Field Experience

- Participated in GPS surveys of the Wasatch fault, Basin and Range, and Yellowstone-Snake River Plain in 1994, 1995, 1998, 2000, 2003, and 2008.
- Helped organize 2000, 2003, and 2008 Yellowstone campaigns, including instrument deployment, housing, and travel.

Computer Skills

- Familiar with Unix/Linux, Mac, and Microsoft operating systems.
- Shell scripting and regular expressions.
- Used GMT to produce maps, plots, and other figures.
- Written programs in Perl, C, and MatLab.
- Able to use Microsoft Office programs (Word, PowerPoint, Excel).
- Able to use Adobe software (Illustrator, Photoshop).
- Prepared web pages using HTML.

Work History

Postdoctural Fellow, University of Utah, 2009-present.
Research Assistant, University of Utah, 1994-2009.
Teaching Assistant, University of Utah, 2000-2006 (alternating years).
Prepared course material, graded papers, and guest-lectured in Tectonophysics and Advanced Seismology.
Summer Intern, Exxon Exploration Company, Chad-Niger Group, 1995.
Summer Intern, National Geodetic Survey, 1996.
Summer Intern, ARCO International, South America Group, 1997.

Professional Affiliations

American Geophysical Union
Geological Society of America

Publications

Published

Puskas, C. M., R. B. Smith, C. M. Meertens, and W. L. Chang, (2007), Crustal deformation of the Yellowstone-Snake River Plain volcanic system: campaign and continuous GPS observations, 1987-2004, *J. Geophys. Res*., 112, B03401, doi:10.1029/2006JB004325.

Puskas, C. M., and R. B. Smith, (2009), Intraplate Deformation and Microplate Tectonics of the Yellowstone Hotspot and Surrounding Western U.S. Interior, *J. Geophys. Res*., 114, B04410, doi:10.1029/2008JB005940.

In Preparation

Puskas, C. M., L. M. Flesch, and R. B. Smith, Dynamics and effects of the Yellowstone hotspot on regional deformation, *in preparation*.

Coauthor

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*, doi:10.1126/science.1146842.

Pollitz, F. F., P. McCrory, D. Wilson, J. Svarc, C. Puskas, and R. B. Smith, (2009), Viscoelastic-cycle model of interseismic deformation in the northwestern United States, *J. Geophys. Res*., in review.

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, mantle flow, *J. Volc. and Geotherm. Res*., in press.

Vasco, D. W., C. M. Puskas, R. B. Smith, and C. M. Meertens, (2007), Crustal deformation and source models of the Yellowstone volcanic field from geodetic data, *J. Geophys. Res*., 112, B07402, doi:10.1029/2006JB004641.

Selected Conference Abstracts (2000-present)

Puskas, C. M., and R. B. Smith, (2009), Stress and Deformation of the Western U.S. and the Effects of the Yellowstone Hotspot, *Earthscope National Meeting*, Boise, ID.

Puskas, C. M., R. B. Smith, and W. L. Chang, (2009), Kinematics and Geodynamics of the Intermountain Region: Wasatch fault to the Yellowstone Plateau, *Geol. Soc. Am. Abstracts with Programs*, 41(6), 16.

Puskas, C. M., L. Flesch, R. B. Smith, K. Settles, and F. Pollitz, (2007), Geodynamics of the Western U.S. interior, *Geol. Soc. Am. Abstracts with Programs*, 39(6), 202.

Puskas, C. M., L. Flesch, and R. B. Smith, (2007), Kinematics and dynamics of Western U.S. deformation, *EarthScope National Meeting*, Monterey, CA.

Puskas, C. M., and R. B. Smith, (2009), Stress and Deformation of the Yellowstone Hotspot and its Effect on the Western U.S. from GPS, Late Quaternary fault slip Rates, and large earthquakes, *EarthScope National Meeting*, Boise, ID.

Puskas, C. M., R. B. Smith, and W. L. Chang, Kinematics and geodynamics of the Intermountain region: Wasatch fault to the Yellowstone Plateau, (2009), *Geol. Soc. Am. Abstracts with Programs*, 41(6), 16.

Puskas, C. M., R. B. Smith, L M. Flesch and K. Settles, (2007), Effects of the Yellowstone hotspot on western U.S. stress and deformation, *Eos Trans. AGU, 88*(52), Fall Meet. Suppl., Abstract V51F-04 .

Puskas, C. M., R. B. Smith, L M. Flesch and K. Settles, (2008), Effects of the Yellowstone hotspot on the geodynamics of the western U.S. interior, *UNAVCO Science Workshop*, Boulder, CO.

Puskas, C. M., R. B. Smith, L. Flesch, and W. L. Chang (2005), The role of the Yellowstone hotspot in western US deformation and lithospheric stress, *Geol. Soc. Am. Abstracts with Programs*, 37(7), 126.

Puskas, C. M., R. B. Smith, C. M. Meertens, (2001), Crustal deformation of the Yellowstone Hotspot: Unifying GPS and geologic data and intraplate modeling, *Eos Trans. AGU*, 82(47), Fall Meet. Suppl., Abstract S31B-0600.

Puskas, C. M., R. B. Smith, C. M. Meertens, (2002), GPS-derived models of intraplate deformation of the Yellowstone Hotspot, *Eos Trans. AGU*, 83(47), Fall Meet. Suppl., Abstract S11A-1104.

Puskas, C. M., R. B. Smith, C. M. Meertens, R. A. Harris, S. J. Jackson, (2000), Deformation of the eastern Snake River Plain volcanic field and surrounding faults from GPS measurements, *Eos Trans. AGU,* 81(48), Fall Meet. Suppl., Abstract V22F-20.

Puskas, C. M., R. B. Smith, G. Waite, L. Flesch, (2004), Kinematic deformation of the interior Western U.S. extensional regime with mantle flow, *Eos Trans. AGU*, 85(47), Fall Meet. Suppl., Abstract T31A-1274.

Coauthor

Chang, W., C. M. Puskas, G. P. Waite, R. B. Smith, C. M. Meertens, (2001), Rheological properties of lithospheric extension from postseismic GPS observations of the 1959 M=7.5 Hebgen Lake, Montana, earthquake, *Eos Trans. AGU*, 82(47), Fall Meet. Suppl., Abstract G31A-0131.

Chang, W., R. B. Smith, C. M. Puskas, J. M. Farrell, (2006), Source modeling and tectono-volcanic implications of the 2004-2006 rapid deformation at Yellowstone Caldera, *Eos Trans. AGU*, 87(52), Fall Meet. Suppl., Abstract G43C-08.

Chang, W., R. B. Smith, C. Meertens, C. M. Puskas, (2002), Rheologic properties of an extending lithosphere from the inversion of postseismic deformation (EDM and GPS) of the 1959 Hebgen Lake, Montana, earthquake, *Eos Trans. AGU*, 83(47), Fall Meet. Suppl., Abstract NG62A-0934.

Farrell, J. M., R. B. Smith, T. Taira, C. Puskas, R. Burlacu, J. Pechmann, H. Heasler, and J. Lowenstern, (2009), Source Properties and deformation analysis of the 2008-2009 Yellowstone Lake earthquake swarm, *Geol. Soc. Am. Abstracts with Programs*, 41(6), 16.

Farrell, J. M., G. P. Waite, R. B. Smith, C. M. Puskas, H. Heasler, B. Bartel, 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.

Jordan, M., R. B. Smith, C. Puskas, J. Farrell, G. Waite, (2005), The Yellowstone Hotspot and related plume: Volcano-tectonics, tomography, kinematics, dynamics and mantle flow, *Eos Trans. AGU*, 86(52), Fall Meet. Suppl., Abstract T51D-1388.

Meertens, C. M., R. B. Smith, C. M. Puskas, (2000), Crustal Deformation of the Yellowstone Caldera from Campaign and Continuous GPS surveys, 1987 – 2000, *Eos Trans. AGU,* 81(48), Fall Meet. Suppl*.,* Abstract V22F-19.

Smith, R. B., and C. Puskas, (2009), Contemporary deformation and kinematics of the Yellowstone hotspot and its effects on the western U.S. from GPS, slip rates, and earthquakes, *Geol. Soc. Am. Abstracts with Programs*, 41(6), 16.

Smith, R. B., C. Puskas, J. Farrell, W. Chang, B. Steinberger, and R. O'Connell, (2008), Effects of the Yellowstone hotspot and mantle plume on the western U.S., *Geol. Soc. Am. Abstracts with Programs*, 40(6), 396.

Smith, R. B., C. Puskas, K. Settles, and J. Farrell (2007), Effects of the Yellowstone hotspot and its mantle plume on the western U.S. interior, *Geol. Soc. Am. Abstracts with Programs*, 39(6), 292.

Smith, R. B., E. Humphreys, P. J. Tackley, C. M. Meertens, K. G. Dueker, G. Waite, J. Crosswhite, D. Schutt, C. Puskas, J. W. Hernlund, (2002), Geodynamics of the Yellowstone Hotspot: Plume or not?, *Eos Trans. AGU*, 83(47), Fall Meet. Suppl., Abstract S72C-04.

Smith, R. B., G. P. Waite, C. M. Puskas, D. L. Schutt, E. D. Humphreys, (2003), Dynamic And kinematic models of the Yellowstone Hotspot constrained by seismic anisotropy, GPS measurements and fault slip rates, *Eos Trans. AGU*, 84(46), Fall Meet. Suppl., Abstract T51G-05.

Smith, R. B., J. Farrell, P. Gettings, C. M. Puskas, (2008), Temporal gravity and mass changes accompanying the 2004-2008 unprecedented uplift of the Yellowtone caldera, *Eos Trans. AGU*, 89(53), Fall Meet. Suppl., Abstract V51D-2066.

Smith, R. B., M. Jordan, C. M. Puskas, J. Farrell, G. P. Waite, (2006), Origin and evolution of the Yellowstone Hotspot from seismic-GPS imaging and geodynamic modeling, *Eos Trans. AGU*, 87(52), Fall Meet. Suppl., Abstract S54A-06.

Smith, R. B., W. Chang, C. Puskas, J. Farrell, (2005), Tectonic and magmatic stress interaction of the Yellowstone volcanic system, *Eos Trans. AGU*, 86(52), Fall Meet. Suppl., Abstract V14B-07.

Waite, G. P., R. B. Smith, C. M. Puskas, D. L. Schutt, (2004), Interpreting crust and mantle stress and strain indicators at Yellowstone, *Eos Trans. AGU*, 85(47), Fall Meet. Suppl., Abstract T33E-07.

White, B. P., R. B. Smith, S. Husen, C. M. Puskas, I. G. Wong, A. G. Sylvester, (2005), Seismotectonics of the Teton fault from a revised earthquake catalog and stress-field inversion, *Eos Trans. AGU*, 86(52), Fall Meet. Suppl., Abstract T51D-1376.