

SCOTT THOMAS MARSHALL



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EDUCATION

- Ph.D. Geosciences: University of Massachusetts Amherst 2008
Dissertation: "Deformation Associated with Faulting Within Interseismic and Geologic Timescales"
- M.S. Geology: University of Idaho 2004
Thesis: "Growth Mechanics and Morphologic Evolution of Cycloids on Europa"
- B.S. Geological Sciences: Wright State University 2001
Thesis: "An Analysis of Heterogeneity in the Miami Valley Aquifer near the Confluence of the Mad and Miami Rivers; Dayton, Ohio"

PROFESSIONAL EXPERIENCE

- Assistant Professor: Appalachian State University, Boone, NC 2008 – Present
Courses: GLY1101 – Introduction to Physical Geology
GLY1103 – Introduction to Environmental and Applied Geology
GLY3160 / PHY3160 – Introduction to Geophysics
GLY4210 – Senior Seminar
GLY5530 / GLY3500 – The Stress Tensor
- Postdoctoral Researcher: University of Massachusetts Amherst 2008
Development of 3D models of southern California with heterogeneous rock stiffness
- Research Assistant: Geosciences Department, University of Massachusetts Amherst 2004 - 2008
3D modeling of active tectonics in southern California using Boundary Element Method models
- Research Assistant: Department of Geology University of Idaho 2002 - 2004
Mechanics of curved fracture formation on Jupiter's icy moon, Europa, using satellite imagery
- Computer Technician: CCB Computers Dayton, Ohio 2001-2002
Specialized in design, construction, and repair of custom PC's

PEER-REVIEWED PUBLICATIONS*

*BOLD INDICATES A STUDENT AUTHOR UNDER MY SUPERVISION

- Marshall, S.T., **Morris, A.C.** *in press.* Mechanics, Slip Behavior, and Seismic Potential of Corrugated Reverse Faults. *Journal of Geophysical Research*, doi:10.1029/2011JB008642.
- Marshall, S.T., Kattenhorn, S.A., and Cooke, M.L. 2010. Secondary normal faulting in the Lake Mead fault system and implications for regional fault mechanics. *in* Umhoefer, P.J., Beard, L.S., and Lamb, M.A., eds., Miocene Tectonics of the Lake Mead Region, Central Basin and Range: Geological Society of America Special Paper 463, p. 289–310, doi: 10.1130/2010.2463(13).
- Marshall, S.T., Cooke, M.L., and Owen, S.E. 2009 Interseismic deformation associated with three-dimensional faults in the greater Los Angeles region, California. *Journal of Geophysical Research*. Vol 114, No. B12403, doi:10.1029/2009JB006439.

- Marshall, S.T., Cooke, M.L., and Owen, S.E. 2008. Effects of non-planar fault topology and mechanical interaction on fault slip distributions in the Ventura Basin, CA. *Bulletin of the Seismological Society of America*. Vol. 98, No. 3, pp. 1113-1127 doi:10.1785/0120070159.
- Meigs, A., Cooke, M.L., and Marshall, S.T. 2008. Using vertical rock uplift patterns to constrain the three-dimensional fault configuration in the Los Angeles Basin. *Bulletin of the Seismological Society of America*, Vol. 98, No. 2, pp. 106-123 doi:10.1785/0120060254.
- Cooke, M.L., and Marshall, S.T. 2006. Fault slip rates from three-dimensional models of the Los Angeles metropolitan area, California, *Geophysical Research Letters*, 33, L21212, doi:10.1029/2006GL027850.
- Kattenhorn, S.A., and Marshall, S.T. 2006. Fault induced perturbed stress fields and associated tensile and compressive deformation at fault tips in the ice shell of Europa: implications for fault mechanics. *Journal of Structural Geology* 28, 2204-2221 doi:10.1016/j.jsg.2005.11.010.
- Marshall, S.T., and Kattenhorn, S.A. 2005. A revised model for cycloid growth mechanics on Europa: evidence from surface morphologies and geometries. *Icarus* 177, 341-366 doi:10.1016/0019-1035(88)90104-2.

CONFERENCE PRESENTATIONS*

*BOLD INDICATES A PRESENTATION BY A STUDENT UNDER MY SUPERVISION

- Dean, J. R.**, Cowan, E.A., Seramur, K.C., Marshall, S.T. 2012 Shallow geophysical surveys of four terraces along the south fork of the new river in the Blue Ridge physiographic province. *Southeast GSA Meeting, Asheville, NC*.
- Irizarry, J.T.**, Marshall, S.T., Severson, C.M., Funning, G.J. 2011 Static Stress Changes due to the 1994 M6.7 Northridge Earthquake and the Potential for Triggered Slip on the San Andreas Fault, *Eos, Transactions of the American Geophysical Union*.
- Marshall, S.T., Funning, G.J., Owen, S.E. 2011 Tectonic, Seasonal, and Anthropogenic Deformation Rates in the Western Transverse Ranges, California from the San Andreas to the Santa Barbara Channel, *Eos, Transactions of the American Geophysical Union*.
- Severson, C.M., Funning, G.J., Marshall, S.T. 2011 Surface Deformation and Slip Distribution of the 1994 Northridge Earthquake Determined from InSAR, *Eos, Transactions of the American Geophysical Union*.
- Marshall, S.T., Funning, G.J., Owen, S.E. 2011 Deformation Rates in the Western Transverse Ranges, California from the San Andreas to the Santa Barbara Channel measured with GPS and Persistent Scatterer InSAR. *Southern California Earthquake Center Annual Meeting, Palm Springs, CA*.
- Bailey, B.L.**, Marshall, S.T., Anderson, W.P. 2010 Integrating ground penetrating radar, electrical resistivity, seismic refraction, and borehole data to image an alluvial aquifer in three dimensions. *Eos, Transactions of the American Geophysical Union*.
- Morris, A.C.**, Marshall, S.T. 2010 Spatial Variations in Slip on Corrugated Reverse Fault Surfaces. *Eos, Transactions of the American Geophysical Union*.
- Marshall, S.T., Owen, S.E., Funning, G.J. 2010 The Ups and Downs of Geodetically-Derived Deformation Rates in the Western Transverse Ranges Region, CA. *Eos, Transactions of the American Geophysical Union*.

- Marshall, S.T., Owen, S.E., Funning, G.J. 2010 Separating Seasonal, Anthropogenic, and Tectonic Deformation in the Western Transverse Ranges Region, CA. *Southern California Earthquake Center Annual Meeting, Palm Springs, CA.*
- Marshall, S.T., Cooke, M.L. 2010. Interseismic Deformation along Finite and Intersecting Faults: Application to the Los Angeles and Ventura Regions, CA. *Southern California Earthquake Center Workshop on Integrating Geodesy into the UCERF3, Pomona, CA*
- Cooke, M.L., Herbert, J., Marshall, S.T., 2010. Spatially Varying Slip Rates on the Southern San Andreas Faults Reflect Fault Geometry and Interaction. *Southern California Earthquake Center Workshop on Integrating Geodesy into the UCERF3, Pomona, CA*
- Marshall, S.T., Cooke, M.L. 2009. Secular Stress Accumulation, Coulomb Stress Changes, and Clock Changes on Los Angeles Regional Faults: Preliminary Results. *Eos, Transactions of the American Geophysical Union.*
- Marshall, S.T., Cooke, M.L. 2009. Secular Stress Accumulation on Los Angeles Regional Faults: Preliminary Results and Implications. *Southern California Earthquake Center Annual Meeting, Palm Springs, CA.*
- Marshall, S.T., Cooke, M.L. Owen, S.E. 2008. Geologic Slip Rates and Interseismic Deformation in the Ventura Region, Southern California *Eos, Transactions of the American Geophysical Union.*
- Kattenhorn, S.A., Marshall, S.T., Cooke, M.L. 2008. Kinematically Coupled Strike-Slip and Normal Faults in the Lake Mead Strike-Slip Fault System, Southeast Nevada *Eos, Transactions of the American Geophysical Union.*
- Cooke, M.L., Marshall, S.T., Dair, L. 2008. Complex Fault Geometries May Account for Discrepancies Between Geologic and Geodetic Slip Rates. *Geological Society of America Abstracts with Programs.* Houston, TX.
- Cooke, M.L., Marshall, S.T., Dair, L., Kendrick, K., Dolan, J., DeGroot, R. 2008. Students and teachers from high schools for the deaf around the country explore the geologic hazards of southern California. *Southern California Earthquake Center Annual Meeting, Palm Springs, CA.*
- Marshall, S.T., Cooke, M.L., Owen, S.E. 2008. Simulating heterogeneous rock properties in crustal deformation models: preliminary results *Southern California Earthquake Center Annual Meeting, Palm Springs, CA.*
- Cooke, M.L., Marshall, S.T. 2008. 3D earthquake and fault distribution in southern California. *NAGT Workshop: Teaching with new geoscience tools: Visualizations, models, and online data, February 10-12, 2008, University of Massachusetts, Amherst.*
- Marshall, S.T., Cooke, M.L., Owen, S.E. 2007. Effects of Material Heterogeneity on Interseismic and Geologic Deformation in Southern California Sedimentary Basins. *Eos, Transactions of the American Geophysical Union.*
- Marshall, S.T., Cooke, M.L., Owen, S.E. 2007. Interseismic Deformation along Intersecting Faults: Application to the Greater Los Angeles Region, CA. *Southern California Earthquake Center Annual Meeting, Palm Springs, CA.*
- Kattenhorn, S.A., Groenleer, J.M., Marshall, S.T., Vetter, J.C. 2007. Shearing-induced tectonic deformation on icy satellites: Europa as a case study. *The Workshop on Ices, Oceans, and Fire: Satellites of the Outer Solar System Boulder, CO.*

- Marshall, S.T., Cooke, M.L., Owen, S.E. 2006. A new technique for creating three-dimensional interseismic mechanical models in regions of interacting non-planar faults: Application to the Los Angeles and Ventura Basins. *Eos, Transactions of the American Geophysical Union*.
- Marshall, S.T., Cooke, M.L. 2006. Fault Trace Slip Distributions in the Ventura and Los Angeles Basins, California: Implications for Past and Future Paleoseismic Sites. *Southern California Earthquake Center Annual Meeting, Palm Springs, CA*.
- Marshall, S.T., Cooke, M.L., Owen, S.E. 2006. Three-dimensional fault topology in the Ventura Basin, California, and a new technique for creating three-dimensional interseismic mechanical models in complex regions. *Proceedings of the International Workshop on Comparative Studies of the North Anatolian Fault (Northwest Turkey) and the San Andreas Fault (Southern California), Istanbul Technical University Aug 14-18, 2006*.
- Kattenhorn, S.A., Billings, S.E., Groenleer, J.M., Marshall, S.T., Vetter, J.C. 2005. Fracture access through the European ice shell: Geologic constraints for the selection of an optimal surface entry site. *Proceedings of the Europa Focus Group Workshop, NASA Ames Research Center, Moffett Field, California, Feb. 27-28, 2006*.
- Marshall, S.T., Cooke, M.L., Owen, S.E. 2005. Comparison of GPS data from the Ventura Basin, California to interseismic three-dimensional mechanical models. *Eos, Transactions of the American Geophysical Union*.
- Cooke, M.L., Marshall, S.T., Meigs, A. 2005. Seismic hazard assessment from validated CFM-based BEM models. *Eos, Transactions of the American Geophysical Union*.
- Owen, S.E., Cooke, M.L., Marshall, S.T. 2005. Interseismic GPS time-series patterns in the Ventura Basin and preliminary comparisons to 3D mechanical models. *Southern California Earthquake Center Annual Meeting, Palm Springs, CA*.
- Cooke, M.L., Marshall, S.T., Meigs, A. 2005. Seismic hazard assessment from validated CFM-based BEM models. *Southern California Earthquake Center Annual Meeting, Palm Springs, CA*.
- Fawcett, D., Meigs, A., Cooke, M.L., Marshall, S.T. 2005. Validation of community fault model alternatives from subsurface maps of structural uplift. *Southern California Earthquake Center Annual Meeting, Palm Springs, CA*.
- Cooke, M.L., Del Castello, M., Jepson, P., Marshall, S.T., Salamoff, S., Solum, J. 2005. Deaf high school students explore structural geology. *Geological Society of America Abstracts with Programs, Vol. 37, No. 7, p. 262*.
- Marshall, S.T., and Kattenhorn, S.A. 2004. The importance of resolved shear stress and dilation at the instant of cycloid cusp formation on Europa. *Eos, Transactions of the American Geophysical Union*.
- Cooke, M.L., Meigs, A.J., and Marshall, S.T. 2004. Testing 3D fault configuration in the northern Los Angeles basin, California via patterns of rock uplift since 2.9 Ma. *Eos, Transactions of the American Geophysical Union*.
- Marshall, S.T., and Kattenhorn, S.A. 2004. Analysis of European cycloid morphology and implications for formation mechanisms. *Abstracts, Workshop on Europa's Icy Shell, Abstract # 7026, Lunar and Planetary Institute, Houston, Texas, February 2004*.
- Marshall, S.T. and Kattenhorn, S.A. 2003. Secondary normal faulting near the terminus of a strike-slip fault segment in the Lake Mead fault system, SE Nevada. *Eos, Transactions of the American Geophysical Union 84*.

Kattenhorn, S.A. and Marshall, S.T. 2003. Secondary fracturing as a tool for unraveling strike-slip fault slip behavior on Europa. *Eos, Transactions of the American Geophysical Union* 84.

RESEARCH GRANTS

Southern California Earthquake Center	Pending
Stress Accumulation Rates for Faults of the Greater Los Angeles Region	
Southern California Earthquake Center	2011-2012
Characterizing Non-tectonic and Interseismic Deformation in the Ventura Basin Region, CA	
Southern California Earthquake Center	2010-2011
Geologic, Interseismic, and Non-tectonic Deformation in the Ventura Region, CA	
North Carolina Space Grant Consortium	2010
Mechanics and Seismic Potential of Wavy Reverse Faults	
UMass Geoscience Leo M. Hall Memorial Award	2006
North Anatolian Fault Paleoseismology Field Studies	
UMass Geoscience H.T.U. Smith Memorial Award	2005
GPS Data Processing at the Jet Propulsion Laboratory, Pasadena	
NASA-EPSCoR	2003
Secondary Fracturing at Multiple Scales in the Lake Mead Region, SE, Nevada	

FIELD EXPERIENCE

Near-Surface Geophysics Experience	2009 - Present
Ground-Penetrating Radar (GPR), DC Resistivity/Conductivity, Seismic Refraction	
Field Trip Co-Leader / Outreach Experience: SOAR-High Collaboration	2005 - 2008
Teaching structural geology to deaf high school students using American Sign Language	
Field Trip Leader: GEO-101 Field Trip: The Berkshire Mountain Belt	2007
A 1-day required field trip for all students in GEO-101 at UMass	
Paleomagnetism Field Work (Spanish Pyrenees)	2006
Detrital paleomag sample collection Competent in spoken and written Castilian Spanish	
Field Trip Leader: UMass Amherst	2006
The Taconic Orogeny and Faults of NW Vermont: 1-Day Undergraduate-Level Trip	
Lake Mead Fault System, Nevada Field Work	2003
Field-based study of secondary fracturing at multiple scales Fracture, fault, and geologic mapping Fault nucleation mechanics	
Field Trip Co-Leader: University of Idaho	2003
Miocene Faults of the Lake Mead Fault System: 2-Day Graduate-Level Trip	

COMPUTATIONAL EXPERIENCE

Programming Experience

Perl, Matlab, Bash, sh, csh, Maple, XHTML, CSS, Java, C

Modeling Experience

Boundary Element Method - Poly3D, Fric2D, iBEM
Finite Element Method - Comsol
Analytical Modeling – Matlab, Maple

Multi-Platform System Administrator

Building/Repairing/Maintaining custom Linux/Windows workstations and servers for research tasks
Multi-user system administration: including RAID arrays and LAN/WAN ssh and sftp servers
Bash, sh, csh, and Perl scripting to automate system tasks
Installation and maintenance of Linux/UNIX, Mac OS, and Windows

Visualization Software/Hardware Experience

Generic Mapping Tools, Matlab, Midland Valley Move, Acrobat Extended (3D), Illustrator, Photoshop,
GoogleEarth, NASA World Wind, NAG Explorer, Fortner Transform, and DeltaGraph
Design, setup, and maintenance of the Computation and Visualization Lab at App State

PROFESSIONAL AFFILIATIONS AND SERVICE

- ◆ American Geophysical Union
- ◆ Seismological Society of America
- ◆ Reviewer for Journal of Structural Geology
- ◆ Reviewer for Geophysical Journal Int.
- ◆ Reviewer for GSA Bulletin
- ◆ Geological Society of America
- ◆ UNAVCO
- ◆ Reviewer for Journal of Geophysical Research
- ◆ Reviewer for Icarus
- ◆ Reviewer for NSF Earthscope

INVITED TALKS

USGS Earthquake Seminar Series, Menlo Park, CA	2007
University of California Riverside	2008
Appalachian State University Department of Mathematical Sciences	2011
University of North Carolina at Chapel Hill	2012