

Nathan A. Toké

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Education

Arizona State University

Ph.D. Candidate, Geological Sciences, Arizona State University, May 2010
Dissertation – “Interactions between Geologic Processes and Society:
Earthquakes and Urban Landscape Modification
Research advisor: Dr. J Ramón Arrowsmith (ramon.arrowsmith@asu.edu)
NSF IGERT Fellowship in Urban Ecology

Universidad De Granada, Spain

Visiting Graduate Student, Departamento de Geodinamica, spring 2008
Sponsoring Faculty: Dr. Antonio Azor

Arizona State University

M.S. Geological Sciences, Arizona State University, December 2005
Thesis - “Paleoseismology, Slip Budget, and Fault Behavior along the Parkfield
segment of the San Andreas Fault”

University of Vermont

B.S. (Cum Laude) in Geology with chemistry minor, 2003.
Honors Thesis – “Compacted green space and effects on storm water
hydrogeology in Burlington, Vermont.”
Research Advisor: Dr. Paul Bierman (pbierman@uvm.edu)
Vermont Scholar’s Award (Financial Support 1999-2003)

Peoples Academy, Morrisville, VT: High School Diploma (Salutatorian), 1999

Honors and Awards

NSF IGERT Fellowship in Urban Ecology, Arizona State University, 2006-Present
GSA Diversity Scholarship, 2009
Troy L. Pewe award for quaternary geology, Arizona State University, 2006
John Dewey Scholar, University of Vermont, 1999-2003
Vermont Scholars Award, University of Vermont, 1999-2003
NSF-REU Fellowship, Plattsburgh State University, 2002
Most outstanding ALANA student, University of Vermont, 2001-2002

Statement of Research and Interests

I am trained as a geologist with a strong emphasis on Quaternary geology and geomorphology of human modified landscapes. I am motivated by a curiosity for how geology affects human populations and how human activities influence processes such as sediment transport. Thus far my research foci could be grouped into two broad categories. One category is *geology of active fault zones* including paleoseismology, earthquake geology, and tectonic geomorphology (especially of the San Andreas Fault) with the purposes of better understanding fault zone structure and mechanics, landscape development, and seismic hazards.

My second research focus is related to how humans modify the landscape, affect geomorphic processes and ecological outcomes. I am interested in effects on soil properties such as compaction, chemistry, and erosion. Also I am interested in sedimentation in urban environments, changes in stormwater flow and chemistry as well urban hazards such as earth fissures and flooding.

Additionally, I am interested in pedagogy as it relates to teaching geological sciences and interdisciplinary topics such as urban ecology.

Peer Reviewed Publications

- Toke**, N.A., JR. Arrowsmith, J.J. Young, C.J. Crosby (2006) "Paleoseismic and post-seismic observations of fault slip along the Parkfield segment of the San Andreas Fault." *Bulletin of Seismological Society of America* 96, 221-238.
- Toke**, N.A. and JR. Arrowsmith (2006) "Reassessment of a slip budget along the Parkfield segment of the San Andreas Fault" *Bulletin of Seismological Society of America* 96, 339-348.
- Rymer, M.J., J.C. Tinsley, III, J.A. Treiman, J R. Arrowsmith, K.B. Clahan, A.M. Rosinski, W.A. Bryant, H.A. Snyder, G.S. Fuis, N.A. **Toké**, and G.W. Bawden (2006) "Surface Fault Slip Associated with the 2004 Parkfield, California, Earthquake" *Bulletin of the Seismological Society of America*, 96, 11 - 27.

Theses, Conference Papers, and Technical Reports

- JR. Arrowsmith and **N.A. Toké** (2009) "Paleoseismic characterization of earthquakes and a geologic slip rate at Parkfield, CA" United States Geological Survey National Earthquake Hazards Reduction Program Final Technical Report: 07HQGR0094. <http://earthquake.usgs.gov/research/external/reports/07HQGR0094.pdf>
- El-Ashmawy, L., N.A. **Toké**, and JR. Arrowsmith "Geologic Investigations of Urban Sedimentation in Tempe, AZ using retention structures." 2009 Arizona Hydrological Society Symposium Proceedings, 10 pp.
- Toké**, N.A. "Paleoseismology, Slip Budget, and Fault Behavior along the Parkfield segment of the San Andreas Fault" M.S. Thesis, Arizona State University, December 2005.
- Toké**, Nathan A. "Compacted green space and effects on storm water hydrogeology in Burlington, Vermont." University of Vermont, JDHP Thesis, May 2003.

Manuscripts in preparation:

- Toke, N.A., JR. Arrowsmith, M.J. Rymer, A. Landgraf, J. Coyan, M. Busch, and D. Haddad. "Long-lived creep, M6 earthquakes, and Holocene slip rate for the main trace of the San Andreas Fault at Parkfield, California" for submission to *Geology*.
- Toke, N.A. L. El-Ashmawy, and JR. Arrowsmith "Rerouting hydrology in an urbanizing desert: effects on sediment transport and geomorphology" for submission to *Geomorphology*.
- Toke, N.A., P. Bierman, P Mellilo, M. McGee, L. Persico, and J. Hickerson. "Remediation of compacted greenspace: improving infiltration capacity and sediment production in urban areas." Target journal not determined.

Professional Meeting Abstracts

- Toke**, N. A., K. Darby, E. Cook, C Mead, J. Brian, T Benn, S. Fisher, C.G. Boone, and S. Semken. "Pedagogy in interdisciplinary higher education: an investigation of faculty and student perspectives." Annual Geological Society of America Meeting October 18-21st, 2009. Abstracts with Programs Vol. 41, No. 7
- El-Ashmawy, L., N.A. **Toké**, and JR. Arrowsmith "Sedimentary Geology of Urban Environments: an example of measuring sediment production and composition in Tempe, AZ" Annual Geological Society of America Meeting October 18-21st, 2009. Abstracts with Programs Vol. 41, No. 7
- Toke**, N. A., J.R. Arrowsmith, M.J. Rymer, A. Landgraf, J. Coyan, M. Busch, D. Haddad "Long-lived creep, M6 earthquakes, and a Holocene slip rate for the main trace of the San Andreas Fault at Parkfield, California" Annual Southern California Earthquake Center meeting, September 12-16th, 2009, Palm Springs, CA.
- El-Ashmawy, L., N.A. **Toké**, and JR. Arrowsmith "Geologic Investigations of Urban Sedimentation in Tempe, AZ using retention structures." Arizona Hydrological Society Symposium Posters August 31st- September 2nd, 2009.
- Toke**, N. A., J R. Arrowsmith, M. Rymer, A. Landgraf, J. Coyan, M. Busch, D. Haddad Paleoseismic interpretation and a preliminary geologic slip rate for the Parkfield segment of the San Andreas Fault, *Eos Transactions. American Geophysical Union*, 89(52), Fall Meeting, December 15-19th 2008, Abstract T41A-1955.
- Hale, R. **Toké**, N.A., Grimm, N. and J R. Arrowsmith "Aridland Urban Hydrology in Phoenix, AZ" 10th annual CAP LTER Meeting, January 10th, 2008, Arizona State University.
- Toké**, N.A. and J R. Arrowsmith "Paleoseismic and Holocene slip rate investigations along the San Andreas Fault, at Parkfield, California" EOS Transactions American Geophysical Union, Fall Meeting, December 13th, 2007 Abstract: T43A-1097.
- Toké**, N.A. and J R. Arrowsmith "Paleoseismic and Holocene slip rate investigations along the San Andreas Fault, at Parkfield, California" Annual Southern California Earthquake Center meeting, September 9-12th, 2007, Palm Springs, CA.
- Toké**, N.A. and J R. Arrowsmith "Fluvial Processes in Phoenix, Maricopa County, Arizona: A natural laboratory for studying dryland fluvial systems" 9th annual CAP LTER Meeting, January 10th, 2007, Arizona State University.
- Toké**, N.A. and J R. Arrowsmith "Fluvial Processes in Phoenix, Maricopa County, Arizona: A natural laboratory for studying urbanized dryland fluvial systems" EOS

- Transactions American Geophysical Union, Fall Meeting, December 11-15th 2006, Abstract: H13A-1356.
- Busch, M., J.R. Arrowsmith, P.J. Umhoefer, G.M. Gutierrez, N. **Toke**, D. Brothers, E. Dimaggio, S. Maloney, O. Zielke, B. Buchanan "Late Quaternary Faulting in the Cabo San Lucas – La Paz region, Baja California." EOS Transactions American Geophysical Union, Fall Meeting, December 11-15th 2006, Abstract: T41D-1612.
- Akciz, S.O., L.B. Grant, J.R. Arrowsmith, O. Zielke, N.A. **Toke**, G. Noriega, J. Cornoyor, E. Starke, N. Reusseu, B. Campbell "Does the new paleoseismological evidence from the Carrizo Plain section of the San Andreas Fault indicate abnormally high late Holocene slip rates?" EOS Transactions American Geophysical Union, December 11-15th 2006, Fall Meeting, Abstract: T21E-01.
- Toké**, N.A. and J.R. Arrowsmith "Fluvial Geomorphology and Urbanization in Phoenix, Maricopa County, Arizona: A Natural Laboratory for Studying Human Alteration of Dryland Fluvial Systems." October 20-22nd, 2006, Binghamton Geomorphology Symposium on the Human Role in Fluvial Systems.
- Toke**, N.A. and J.R. Arrowsmith "Estimating a Slip Budget along the Parkfield segment of the San Andreas Fault: A Slip Deficit since 1857" Southern California Earthquake Center Annual Meeting, Proceedings and Abstracts, vol. 15. September 11-14th, 2005
- Akciz, S., L.B. Grant, J.R. Arrowsmith, O. Zielke, N.A. **Toke**, G. Noriega, E. Starke, and J. Cornoyer. "Constraints on ruptures along the San Andreas Fault in the Carrizo Plain: Initial Results from 2005 Bidart Fan Site Excavations." Southern California Earthquake Center Annual Meeting, Proceedings and Abstracts, vol. 15. September 11-14th, 2005
- Toke**, N.A., Arrowsmith, J.R., Crosby, C.J., and Young, J.J. "Paleoseismology and Tectonic Geomorphology: Results from the Parkfield, CA Segment of the San Andreas Fault." EOS Transactions American Geophysical Union, Fall Meeting, Abstract T13A 1336, December 13-17th, 2004
- Toke**, N.A., Arrowsmith, J.R., Crosby, C.J., and Young, J.J. "Preliminary Paleoseismology Results from the Parkfield, CA Segment of the San Andreas Fault." Southern California Earthquake Center Annual Meeting, Proceedings and Abstract, vol. 14. September 19-21st, 2004.
- Klepeis, K.A., Clarke, G.L., and **Toke**, N., "Exhumation and Topographic Uplift along Continental Strike-Slip and Oblique-Slip Faults in Southwest New Zealand." Geological Society of America Abstracts Vol. 35, No. 6, 2003.
- Billow, S., Krasilovsky, M., Rimbault, J., **Toke**, N., Romanowicz, E.A, and Franzini, D.A. "A preliminary hydrogeochemical assessment of the Little Chazy River, northeastern New York" 2003 Geological Society of America abstracts, V.35, No.1
- Toke**, N.A. "Tectonics and Topography: Some New Relationships Identified along the Alpine Fault in New Zealand", Vermont Geological Society Newsletter, spring 2002.
- Klepeis, K.A., Claypool, A., and **Toke**, N., "Dynamic topography in transpressional regimes: an example from the New Zealand plate boundary zone." Geological Society of America abstracts Vol. 34, No. 1, 2002
- Lord, A., Lini, A., **Toke**, N., Parris, A., and Bierman, P. "Contrasting evolution of northern New England post-glacial lakes." Geological Society of America abstracts, Vol. 34, No. 1, 2002.

Guest Lectures or Colloquia

- Mesa Community College “Faults and Earthquake Hazards.” Fall 2008.
- University of Granada, Spain, Dept. de Geodinámica colloquium: “Earthquake history of the central San Andreas Fault: paleoseismology, slip budget analysis, and implications for fault zone structure and seismic hazard.” May, 2008.
- University of Potsdam, Germany: Guest lecturer for a short course led by Manfred Strecker on Active Tectonics: “Strike-Slip Tectonics: evaluating tectonic activity along the San Andreas Fault system” April, 2008
- Arizona State University, SESE Graduate Research Seminar: “Paleoseismology and Slip Rate investigations at Parkfield, CA.” November, 2007.

Workshops (co-organized)

- The Superstition Vistas: developing a sustainable city east of Phoenix, AZ. September-December 2008.
- Interdisciplinary Teaching and Pedagogy – investigation of student and instructor perspectives, January-June 2009.

Memberships and Organizations

Southern California Earthquake Center (2003-present)
 Geological Society of America (2002-present)
 American Geophysical Union (2004-present)
 European Geosciences Union (2008)

External Research Support	Sponsor	Total	Explanation
Human modification of hydrologic structure and sedimentation in a desert city	2009 GSA Graduate Student Grants	\$2,800	
Paleoseismic Investigation and slip rates for the Southwest Fracture Zone and the main San Andreas Fault, at Parkfield, California	2008 Southern California Earthquake Center	20 radiocarbon dates	Co-written with the PI: JR. Arrowsmith

Paleoseismic Characterization of Earthquakes at Parkfield	2007 USGS NEHRP	\$43,000	Co-written with the PI: JR. Arrowsmith
NSF IGERT Fellowship	2006 Arizona State University NSF IGERT in Urban Ecology Program	~\$31,000 +tuition and fees per year	3 years of support spread over PhD program
Investigations of relationships between tectonics and topography: Alpine Fault, NZ	2002 UVM Geology Hawley Award Undergraduate Research	\$1,000	

Mentoring

Laila El-Ashmawy, undergraduate student in ASU’s Civil, Environmental, and Sustainable Engineering Program. Barrett Honors College Research Project: “Urban Sedimentation in a Desert City” (working title).

Teaching Experience

INTERDISCIPLINARY AND CAREER OPPORTUNITIES IN THE GEOSCIENCES
Arizona State University, spring 2009.

I organized, created, and led a seminar for upper level undergraduate students with the purpose of instituting an additional level of mentoring for undergraduates in the School of Earth and Space Exploration at ASU. Topics covered included: interdisciplinary theory, professional development activities, literature review of interdisciplinary boundaries within the geosciences, and career opportunities. I organized guest speakers on career opportunities from academia, government, consulting firms, and industry.

STRIKE-SLIP TECTONICS: EVALUATING TECTONIC ACTIVITY ALONG THE SAN ANDREAS FAULT SYSTEM

University of Potsdam, Germany, Spring, 2008

I was a guest lecturer for a short course on Active Tectonics led by Dr. Manfred Strecker. Topics I covered included paleoseismology, evaluating tectonic landforms on strike slip faults, and a case study of the central San Andreas Fault. I also developed an exercise titled “Interpreting the earthquake record of the southern San Andreas Fault.”

FIELD CAMP TEACHING ASSISTANT, *Arizona State University, summer 2005 and summer 2006*. Supervisor: Dr. Tom Sharp (*tom.sharp@asu.edu*)

I participated in one on one instruction in geologic mapping and report writing with ASU field geology students near Payson, AZ. I covered topics such as mapping faults, folds, and paleoshoreline facies.

INTRODUCTORY GEOLOGY TEACHING ASSISTANT, *Arizona State University, fall 2005*. Supervisor: Dr. Rick Hervig (*hervig@asu.edu*)

I led review sessions for students, worked one on one with students during office hours, filled in as lecturer for topics related to earthquakes and seismology, graded assignments and tests, and organized online coursework communication.

INTRODUCTORY GEOLOGY LAB INSTRUCTOR, *Arizona State University, spring 2005*. Supervisor: Julia K. Johnson (*Julia.Johnson@asu.edu*).

I led three class sections with short lectures and one on one interaction as students worked through an introductory geology curriculum designed by ASU faculty. Organized online coursework communication and graded all lab work.

ASSISTANT INTRODUCTORY GEOLOGY LAB INSTRUCTOR, *University of Vermont, Spring 2003*. Supervisor: Dr. Barry Doolan.

Research Experience

GRADUATE FELLOW and RESEARCH ASSOCIATE, *Arizona State University, August 2003 – Present*. Supervisor: Dr. J Ramon Arrowsmith

- Tectonic geomorphic mapping along the Parkfield, CA segment of the San Andreas Fault and compilation of geospatial data into a GIS.
- Comparison of Maricopa Country Flood Control District hydrologic data with landcover changes in Phoenix, AZ
- Analysis of urban sedimentation and hydrology in Tempe, AZ
- Excavation of paleoseismic trenches in Parkfield, CA for analysis of San Andreas Fault segment behavior.
- Exploration of systematic differences between SRTM and NED digital elevation models utilizing GIS and MATLAB.
- Field work organization and tectonic geomorphic mapping in southern Baja, Mexico.
- Field assistance on the Bidart Fan and Van Matre Ranch paleoseismic and slip rate investigations in the Carrizo segment of the San Andreas Fault.
- Investigations of interdisciplinary pedagogy from student and instructor perspectives
- Analysis of Environmental Justice related to earthquake hazards in California.

UNDERGRADUATE RESEARCH ASSISTANT/TECHNICIAN, *University of Vermont, 2001-2003*. Supervisors: Dr. Paul Bierman, Dr. Andrea Lini, Dr. Keith Klepeis.

- Development and analysis of an experiment to discern the effects of lost green-space on overland storm-water events in the City of Burlington, Vermont.

- Field and Laboratory technician for isotope analysis of northern New England lake sediments for analysis of post-glacial lake evolution.
- GIS analysis of relationships between faulting and uplift along the Alpine Fault, New Zealand

RESEARCH EXPERIENCE FOR UNDERGRADUATES, *Plattsburgh State University, summer 2002. Supervisors: Dr. David A. Franzi and Dr. Edwin A. Romanowicz.*

- Development of a temporary stream gaging network along the Little Chazy River and its tributaries in upstate NY and analysis of both physical and chemical hydrogeologic data using GIS.

Computing Skills

ESRI ArcGIS software, Remote Sensing using IMAGINE, Image J, limited use with ENVI, Graphics production using Adobe Illustrator/Photoshop software, Microsoft Office Suite, HTML coding, Some experience with C and Matlab Programming. Use of Google Earth for displaying geologic data, use of Open Topography and GEON tools for acquiring and processing high resolution topographic datasets.

Geologic Skills

Geomorphic and geologic mapping, aerial photographic interpretation, remote sensing analyses, paleoseismic excavations, stratigraphic logging, operation of Terrestrial LiDAR Scanner, total station operation, field geophysical experience (gravity, conductance, small seismic arrays), Handheld GPS applications, collection of shallow lake sediment cores, construction of temporary weirs for storm water observation, groundwater well, flume, and weir level measurements/observation, Field collection of surface water samples, stream gaging, measuring soil infiltration capacity, data mining, and statistical analyses.

Applicable Coursework

Coursework in Earth Science: Advanced Geomorphology, Advanced Structural Geology, Fluvial Processes, Hydrogeology, Stratigraphy and Sedimentology, Seismology, Subduction Zones, Short Course on Active Tectonics at Potsdam Germany.

Coursework in Human Environmental Interactions: Ecosystem Research, Environmental Policy, History of the City and the Environment, Environmental Justice in the City, Climatology, Urban Ecological Systems, Biogeochemistry, and workshop on development of Superstition Vistas.

Technical Courses Including Geographical Analysis: Remote Sensing of Quaternary Landscapes, ArcGIS, Remote Sensing, OSHA Hazmat course, Numerical Methods programming in C.

Pedagogy and Academia: Teaching in Earth and Space Sciences, IGERT Mentoring Seminar, Workshop on investigating instructor and student perspectives of interdisciplinary classes, Social Dimensions of Science – ethics.

Field Geology: Field Geology in Verde Valley, AZ (geomorphic mapping), UA Field Geology Camp in Utah, Field Volcanology of Guatemala, Regional Field Geology of Colorado, and 2 years assisting at ASU's geology field camp. Field Geophysics, Cordilleran Regional Geology

Additional Science Coursework: Organic and Physical Chemistry, Physics, Statistics, and Calculus.