

Marie D. Arrowsmith

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SECURITY CLEARANCE	Department of Energy Q (issued: 2007)	
RESEARCH INTERESTS	Verification seismology, regional wave propagation, source characterization, educational seismology, and seismo-acoustics.	
EDUCATION	Southern Methodist University , Dallas, TX USA Ph.D., Geophysics, May 2009 GPA: 3.84/4.00 <ul style="list-style-type: none">• Thesis Topic: Mining Explosion Identification as an Application to Treaty Verification• Advisor: Professor Brian Stump• Area of Study: Seismology University of Arizona , Tucson, AZ USA B.S., Geosciences, May 2002 Undergraduate GPA: 3.93/4.00; Graduate GPA: 4.00/4.00 <ul style="list-style-type: none">• <i>Summa cum Laude</i>• Geophysics specialization	
AWARDS	P.E.O. International <ul style="list-style-type: none">• <i>Scholar Award</i>, 2006 - Nationally awarded merit-based scholarship for women pursuing postgraduate education. National Science Foundation (NSF) <ul style="list-style-type: none">• <i>Graduate Research Fellowship</i>, 2003 - Three-year funding for outstanding early career graduate students in the sciences; awarded nationally based on intellectual merit and broader impacts.• <i>Research Experience for Undergraduates Grant</i>, 2001 - Presented to undergraduates participating the Summer of Applied Geophysical Experience field program; acceptance in the program is based on merit and is awarded to geophysics graduate and undergraduate students worldwide.• <i>GK-12 Fellowship</i>, 2000, 2001 - Competitively awarded for the purpose of strengthening and sustaining relationships with K-12 teachers and students in the community and enriching science education. Morris K. Udall Foundation <ul style="list-style-type: none">• <i>Scholarship</i>, 2001 - Nationally competitive scholarship awarded to undergraduates pursuing careers related to the environment.	

University of Arizona

- *John Sumner Award*, 2001
- *L. Austin Weeks Undergraduate Scholarship*, 2000
- *Reuben and Myron Winslow Scholarship*, 2000

RESEARCH
EXPERIENCE

Los Alamos National Laboratory, Los Alamos, NM USA

Graduate Research Assistant

May 2002 to present

Assistance with various programmatic efforts within the Ground-Based Nuclear Explosion Monitoring (GNEM) program, with a focus on seismic event identification, surrogate station analysis, and phase amplitude tomography.

Southern Methodist University, Dallas, TX USA

Graduate Research Assistant

September 2006 to May 2009

Discriminant development for mining explosions against natural seismicity in both the Western United States using high-quality ground truth data and in Russia, using data obtained through collaborative work with Russian scientists.

NSF Graduate Research Fellow

August 2003 to September 2009

Development and application of a methodology to utilize historical seismic data at long-operating stations to predict explosion characteristics at newly installed seismic stations (this methodology is currently being utilized at the Air Force Technical Applications Center in their treaty monitoring efforts);

University of Arizona, Tucson, AZ USA

Graduate Research Assistant

August 2002 to May 2003

Independent research on amplitude correction factors for seismic discriminants, including seismic data collection, amplitude measurement, and development and testing of various Matlab codes.

TEACHING
EXPERIENCE

Southern Methodist University, Dallas, TX USA

Graduate Teaching Assistant

August 2006 to December 2006

Geology 1313 - Earthquakes and Volcanoes.

- Supervised the preparation and teaching of geophysics-based laboratory activities for undergraduate non-majors; collaboration with another teaching assistant to manage the progress of approximately sixty students through the laboratory section of the course. Developed a particular emphasis on the integration of technology-based teaching into weekly laboratory activities.

University of Arizona, Tucson, AZ USA

Graduate Teaching Assistant

August 2002 to May 2003

Geosciences 322 - Introduction to Geophysics.

- Independently taught this weekly majors-level laboratory section of approximately fifteen students. Provided supplementary instruction of lecture course material; writing, editing, and organization of lab exercises.

Geosciences 218 - Geologic Disasters and Society.

- Worked as part of a team of three teaching assistants to manage a large class (120 students) of non-majors, including providing individual instruction to students needing additional student-teacher interaction; taught hands-on workshops to aid in the completion of assigned course activities; facilitated course review sessions.

NSF Graduate Teaching Fellow

May 2000 to May 2002

Curriculum development and implementation, specifically field-based and computer driven earth and environmental science activities for high school students that are inquiry-based, integrate technology, and follow national science education standards. Additionally, led teachers in in-service trainings as well as taught and assisted with classroom activities and field lessons. Fellowship tenure was as an undergraduate.

EXTRA-
CURRICULAR
ACTIVITIES

Rocky Mountain Geophysics, LLC (RMG), Los Alamos, NM USA

Consultant

May 2007 to December 2008

Provided analysis for National Nuclear Security Administration (NNSA) funded research as part of Pacific Northwest National Laboratory subcontract to RMG. This NNSA research focuses on the development of the decision mathematics for the next generation seismic identification system.

Science Education Solutions (SES), Los Alamos, NM USA

Consultant

January 2005 to December 2008

Website design for various science education programs and projects, as well as field-testing and review of geoscience curriculum materials developed by SES for K-16 education.

The Incorporated Research Institutions for Seismology Consortium,
Washington, DC USA

Consultant

December 2001 to August 2003

Design of a website interface for EarthScope's education and outreach efforts, including graphic design, page layout, and HTML formatting; coordination with a website programmer to merge functional tools into a visually pleasing and easily navigable site.

PEER-
REVIEWED
PUBLICATIONS

M. D. Arrowsmith, S. R. Taylor, and T. C. Wallace (2008), Using Interstation Amplitude Correction Factors to predict regional phase amplitudes, *Bull. Seism. Soc. Am.*, 98(6), 2590-2614.

Arrowsmith, S. J., M. A. H Hedlin, B. W. Stump, and **M. D. Arrowsmith** (2008), Infrasonic Signals from Large Mining Explosions, *Bull. Seism. Soc. Am.*, 98(2), 768-777.

Arrowsmith, S. J., M. A. H. Hedlin, **M. D. Arrowsmith**, and B. W. Stump (2007), Identification of delay-fired mining events using seismic arrays: Application to the PDAR array in Wyoming, USA, *Bull. Seism. Soc. Am.*, 97(3), 989-1001.

Arrowsmith, S. J., **M. D. Arrowsmith**, M. A. H. Hedlin, and B. W. Stump (2006), Discrimination of delay-fired mining events in Wyoming using an automatic time-frequency discriminant, *Bull. Seism. Soc. Am.*, 96(6), 2368-2382.

M. D. Arrowsmith (2009), Mining Explosion Identification as an Application to Treaty Verification, Southern Methodist University, Electronic Dissertation, 519 pages.

M. D. Arrowsmith, S. J. Arrowsmith, B. Stump, and M. A. H. Hedlin (2008), A Suite of Discriminants for Ground-Truth Mining Events in the Western U.S. and its Implications for Discrimination Capability in Russia, Proceedings of the 30th Monitoring Research Review, Portsmouth, VA, September 23 - 25, LA-UR-08-05261.

M. D. Arrowsmith, S. J. Arrowsmith, B. Stump, and M. A. H. Hedlin (2007), Discrimination Capability for Mining Events in the Altai-Sayan Region of Russia and the Western United States, Proceedings of the 29th Monitoring Research Review, Denver, CO, September 25 - 27, LA-UR-07-5613.

Lay, T., X. Xie, X. Yang, and **M. D. Arrowsmith** (2007), Development of Regional Phase Tomographic Attenuation Models for Eurasia, Proceedings of the 29th Monitoring Research Review, Denver, CO, September 25 - 27, LA-UR-07-5613.

M. D. Arrowsmith (2006), A report on the quality of seismic amplitudes measured using broadband and short-period vertical component waveforms requested from the IRIS data archives, Los Alamos National Laboratory, LA-UR-06-6649.

Arrowsmith, S. J., **M. D. Arrowsmith**, M. A. H. Hedlin, and B. W. Stump (2006), Discrimination of mining events using regional seismic and infrasound waveforms: Application to the US and Russia, Proceedings of the 28th Seismic Research Review, Orlando, FL, September 19 - 21, LA-UR-06-5471.

Lay, T., X. Yang, X. Xie, S. Taylor, and **M. D. Arrowsmith** (2006), Development of Regional Phase Tomographic Attenuation Models for Eurasia, Proceedings of the 28th Seismic Research Review, Orlando, FL, September 19 - 21, LA-UR-06-5471.

Randall, G., X. Yang, H. Hartse, M. Maceira, **M. D. Arrowsmith**, and S. Taylor (2006), Regional Event Identification Research in Asia, Proceedings of the 28th Seismic Research Review, Orlando, FL, September 19 - 21, LA-UR-06-5471.

M. D. Arrowsmith, S. J. Arrowsmith, B. W. Stump, and M. Hedlin (2005), Discrimination of small events using regional waveforms: Application to the US and Russia, Proceedings of the 27th Seismic Research Review, Rancho Mirage, CA, September 20 - 22, LA-UR-05-6407.

Yang, X., S. Taylor, M. Maceira, H. Patton, J. Rutledge, G. Randall, and **M. Renwald** (2004), Regional Event Identification Research in Eastern Asia, Proceedings of the 26th Seismic Research Review, Orlando, FL, September 21-23, LA-UR-04-5801.

Leidig, M., B. Stump, J. Bonner, C. Hayward, A. Velasco, D. Baker, H. Hooper, W. Walter, X. Yang, R. Zhou, C. Edwards, **M. Renwald**, and J. Lewkowicz (2004), Source Phenomenology Experiments in Arizona, Proceedings of the 26th Seismic Research Review, Orlando, FL, September 21-23, LA-UR-04-5801.

Hedlin, M., B. Stump, S. Arrowsmith, and **M. Renwald** (2004), A Comparative Test of Seismic Discriminants for Mining Explosions, Proceedings of the 26th Seismic Research Review, Orlando, FL, September 21-23, LA-UR-04-5801.

ReVelle, D., R. Whitaker, J. Mutschlecner, and **M. Renwald** (2004), Discrimination of Earthquakes and Mining Blasts Using Infrasound, Proceedings of the 26th Seismic Research Review, Orlando, FL, September 21-23, LA-UR-04-5801.

Renwald, M. D., S. R. Taylor, and T. C. Wallace (2003), Calibrating the MKAR Array Using Transfer Functions, Los Alamos National Laboratory, LA-CP-03-0686, LA-UR-03-5646.

Renwald, M. D., T. C. Wallace, and S. R. Taylor (2002), Transfer Functions and Seismic Discrimination, Proceedings of the 24th Seismic Research Review, Ponte Vedra Beach, FL, September 17-19, LA-UR-02-5048.

Renwald, M. D., S. R. Taylor, and T. C. Wallace (2002), Transfer Functions and Seismic Discrimination: a KNET Case Study, Los Alamos National Laboratory, LA-UR-02-7658.

TALKS AND
POSTER
PRESENTATIONS

Arrowsmith, M. D., S. J., Arrowsmith, B. W. Stump and M. Hedlin (2008), A Tale of Two Countries, Three Discriminants, and Many Mining Explosions, Eos Trans. AGU, 89(53), Fall Meet. Suppl., Abstract S11B-1746.

Renwald, M. D., S. J., Arrowsmith, B. W. Stump and M. Hedlin (2004), Analysis of Regional seismic waveforms from mining explosions in the United States and Russia, Eos Trans. AGU, 85(47), Fall Meet. Suppl., Abstract S41DB-0971.

Ortiz, A. M., **M. D. Renwald**, T. K. Baldwin, and M. K. Hall (2004), Bridging the Gap - Networking Educators using Real-Time Seismic Data, Eos Trans. AGU, 85(47), Fall Meet. Suppl., Abstract ED33A-0760.

Renwald, M. D., B. W. Stump, C. Hayward, and R. Zhou (2003), Development of a Suite of Seismic Discriminants for Characterizing Mining Explosions in Southeastern Arizona, Eos Trans. AGU, 84(46), Fall Meet. Suppl., Abstract S32B-0844.

Baldwin, T. K., **M. D. Renwald** and M. K. Hall-Wallace (2003), Using an AS-1 to Excite Students About Research and Science, United States Educational Seismology Network Meeting, Baltimore, Maryland, September 13 - 16.

Renwald, M. D., S. R. Taylor, and T. C. Wallace (2003), Calibrating the MKAR Array Using Transfer Functions, Seismological Society of America Annual Meeting, San Juan, Puerto Rico, April 29 - May 2.

Renwald, M. D., T. K. Baldwin, and T. C. Wallace (2003), Seismic Analysis of the Space Shuttle Columbia Disaster, Geodaze: Department of Geosciences Research Symposium, Tucson, Arizona, April 10 - 12.

Renwald, M. D., B.D. Hance, and M.K. Hall-Wallace (2003), Engaging and Educating Via the Web: Designing a National Scale Outreach Effort, Geodaze: Department of Geosciences Research Symposium, Tucson, Arizona, April 10 - 12.

Renwald, M. D., T. C. Wallace, and S. R. Taylor (2002), Transfer Functions and Seismic Discrimination: a KNET Case Study, Eos Trans. AGU, 83(47), Fall Meet. Suppl., Abstract S12A-1174.

Renwald, M. D., T. C. Wallace, and S. R. Taylor (2002), Transfer Functions and Seismic Discrimination, Seismological Society of America Annual Meeting, Victoria, Canada, April 17 - 19.