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CURRENT POSITION

Postdoctoral Research Associate, University of Illinois Chicago

EDUCATION

2021 Ph.D., Geophysics, University of Utah
2017 M.S., Geophysics, Southern Methodist University
2015 B.S., Geophysics and Applied Mathematics, Southern Methodist University

RESEARCH INTERESTS

Forensic seismology–seismic discrimination, machine learning applications, anthropogenic earthquakes; Earthquake relocation; Network seismology

HONORS

2021–*present* Bridge to Faculty Scholar, University of Illinois Chicago

POSITIONS HELD

2021–*present* Postdoctoral Research Associate, University of Illinois Chicago, Illinois, USA.
2017–2021 Graduate Research Assistant, University of Utah Seismograph Stations, Utah, USA; primary research advisor: Dr. Keith Koper.
2017 Space Scholar, Air Force Research Laboratory (summer internship), New Mexico, USA; primary research advisor: Dr. G. Eli Baker.
2016 Space Scholar, Air Force Research Laboratory (summer internship), New Mexico, USA; primary research advisor: Dr. G. Eli Baker.
2015–2017 Graduate Research Assistant, Southern Methodist University, Texas, USA; primary research advisor: Dr. Heather DeShon.
2015 Undergraduate Research Assistant, Southern Methodist University, Texas, USA; primary research advisor: Dr. Heather DeShon.
2013–2014 Undergraduate Research Assistant, Southern Methodist University, Texas, USA; primary research advisor: Dr. Crayton Yapp.

INVITED TALKS

2022 Virginia Tech Department of Geosciences Seminar Series, Blacksburg, VA.
2022 University of Illinois Chicago Latino Cultural Center, Chicago, IL.
2021 University of Chicago Department of Geophysical Sciences, Chicago, IL.
2021 University of Texas Institute for Geophysics Discussion Hour, virtual.
2020 University of Washington Earth and Space Science Colloquium, virtual.

- 2020 University of Oregon Department of Earth Sciences Seminar Series, virtual.
- 2020 Pardee Keynote Symposium, Geological Society of America Annual Meeting, virtual.

PROFESSIONAL DEVELOPMENT

- 2020–2021 Co-organizer, SeismoTea (seminar series).
- 2018–2021 Duty Seismologist, University of Utah Seismograph Stations.

Courses

- 2019 Introduction to Podcasting, Alda–Kavli Learning Center, virtual.
- 2019 Undergraduate Research Mentorship Development Program, University of Utah Office of Undergraduate Research, Utah, USA.
- 2017 CIG–LLNL Computational Seismology Workshop, Lawrence Livermore National Laboratory, California, USA.

DIVERSITY, EQUITY, JUSTICE & INCLUSION

- 2022 Session Convener, “Diversity, Equity, and Inclusion in Seismology,” Seismological Society of America Annual Meeting, Washington, USA.
- 2021 Session Corresponding Convener, “Inspiring a New Generation of Seismology Leaders,” Seismological Society of America Annual Meeting, virtual.
- 2020–2021 Member, Pride Week Leadership Committee, Lesbian Gay Bisexual Transgender Resource Center, University of Utah, Utah, USA.
- 2020–2021 Member, Committee for the Advancement of Inclusion and Diversity, College of Mines and Earth Sciences, University of Utah, Utah, USA.
- 2019–2021 President, Inclusive Earth, student organization, College of Mines and Earth Sciences, University of Utah, Utah, USA.
- 2018–2019 Outreach Coordinator, Inclusive Earth, student organization, College of Mines and Earth Sciences, University of Utah, Utah, USA.

Presentations

- 2019 “Inclusive Earth: Promoting Excellence through Diversity and Inclusion in the Earth Sciences,” American Geophysical Union Fall Meeting, San Francisco, California, USA.

SCIENCE COMMUNICATION

- 2021 EARly-concept Grants for Exploratory Research (EAGER), interview, virtual.
- 2020 Preparedness Day on the Hill, exhibit, Utah State Capitol, Utah, USA.
- 2015–2017 Perot Museum of Nature and Science, Science Flash Exhibit, Texas, USA.

K-12 Outreach Activities

- 2019 Hawthorne Elementary, 3rd grade class, UU campus visit, Utah, USA.
- 2018 Oakdale Elementary, 4th grade class, QuakeCatcher demonstration, Utah, USA.
- 2016 Expanding Your Horizons Northern Utah, 6th grade level, Seismology workshop, Utah, USA.
- 2016 Founders Classical Academy of Flower Mound, 6th grade science class, question and answer session, Texas, USA.

- 2016 Travis Middle School, pre-AP Mathematics classes, SMU campus visit, Texas, USA.
- 2016 Travis Middle School, pre-AP Mathematics classes, earthquake location exercise, Texas, USA.

UNIVERSITY SERVICE

- 2020–2021 Member, University Promotion and Tenure Advisory Committee; University of Utah, Utah, USA.
- 2018–2021 Member, Academic Affairs Committee; College of Mines and Earth Sciences, University of Utah, Utah, USA.

PROFESSIONAL SERVICE

- 2021–*present* Board Member, Standards and Copy-Editing Team, *Seismica* (new journal).
- 2022–*present* Early career member, Diversity, Equity, and Inclusion Committee, Seismological Society of America.
- 2020–2021 Member, Diversity, Equity, and Inclusion Task Force, Seismological Society of America.

TEACHING EXPERIENCE

- 2019 Teaching Assistant, Department of Geology and Geophysics, University of Utah, Utah, USA; *Seismic Sources* (graduate).
- 2017 Teaching Assistant, Department of Earth Sciences, Southern Methodist University, Texas, USA; *Introduction to Oceanography* (undergraduate).
- 2015–2016 Tutor, Center for the Academic Development of Student–Athletes, Southern Methodist University, Texas, USA; *Introduction to Geology, Modern and Ancient Climates*, and *Air Quality Seminar* (undergraduate).
- 2013–2015 Teaching Assistant, Department of Physics, Southern Methodist University, Texas, USA; *Electricity and Magnetism* (undergraduate).

STUDENTS MENTORED

- 2020–2021 Belinda Kyeremeh (M.S.; with James Holt and Jessica Wempen)
- 2020 Amy Record (M.S.; with Kristine Pankow)
- 2018–2019 Alysha Armstrong (B.S.; with Keith Koper and Relu Burlacu)
- 2017–2019 Jonathan Voyles (B.S.; with Keith Koper and Relu Burlacu)
- 2016–2017 M. Elizabeth Layton (B.S.; with Heather DeShon)

PUBLICATIONS IN PREPARATION

Holt, M. M., Koper, K. D., Baker, B. (est. 2022). The calibration and optimization of ML:Mc as a depth discriminant, *for submission to Bulletin of the Seismological Society of America*.

- Holt, M. M.**, Koper, K. D., Pyle, M. L., Walter, W. R. (est. 2022). M_L : M_c applied to nuclear explosions detonated at the Nevada National Security Site, *for submission to Seismological Research Letters*.
- Holt, M. M.**, Holt, J., Koper, K. D. (est. 2022). Distinguishing between natural earthquakes, mining-induced seismic events, and explosions in Utah using corner frequency and moment, *for submission to Geophysical Research Letters*.
- Holt, M. M.**, Pechmann, J. C., Baker, B., Koper, K. D., Farrell, J. (est. 2022). Focal mechanisms of the 2020 Magna, Utah earthquake sequence using manual and deep-learning first motions from a large- N array and permanent seismic network, *for submission to Seismological Research Letters*.

PUBLICATIONS (Citations: 209 | h-index: 6 | i10-index: 5 | Publications: 12)

- Lerback, J. C., **Holt, M. M.**, Enriquez St. Pierre, G. A., Putman, A., Tulley-Cordova, C. L., Smith, W. A., Caughman, L., and Alvarez, S (2021). Community voices: Achieving real diversity in STEM requires the ability to transform institutions, *Nature Communications*, reserved DOI: <https://doi.org/10.1038/s41467-021-27376-4>. Currently under embargo.
- Wang, R., Schmandt, B., **Holt, M.**, Koper, K. (2021). Advancing Local Distance Discrimination of Explosions and Earthquakes with Joint P/S and M_L – M_c Classification, *Geophysical Research Letters*, 48, 1–11, <https://doi.org/10.1029/2021GL095721>.
- Velasco, A. A., Aderhold, K., Alfaro-Diaz, R., Brown, W., Brudzinski, M., Fraiser, M., **Holt, M. M.**, Mori, J., Noriega, G., Scharer, K., Templeton, D., Terra, F., Williams-Stroud, S. (2021). SSA task force on diversity, equity, and inclusion: Toward a changing, inclusive future in earthquake science, *Seismological Research Letters*, 92, 3267–3275, <https://doi.org/10.1785/0220210170>.
- Baker, B., **Holt, M. M.**, Pankow, K. L., Koper, K. D., Farrell, J. (2021). Monitoring the 2020 Magna, Utah, Earthquake Sequence with Nodal Seismometers and Machine Learning, *Seismological Research Letters*, 92, 787–801, <https://doi.org/10.1785/0220200316>.
- Koper, K. D., **Holt, M. M.**, Voyles, J. R., Burlacu, R., Pyle, M. L., Wang, R., and Schmandt, B. (2020). Discrimination of Small Earthquakes and Buried Single-fired Chemical Explosions at Local Distances (<150 km) in the Western U. S. from Comparison of Local Magnitude (M_L) and Coda Duration Magnitude (M_c), *Bulletin of the Seismological Society of America*, 111, 558–570, <https://doi.org/10.1785/0120200188>.
- Pang, G., Koper, K. D., Mesimeri, M., Pankow, K. L., Baker, B., Farrell, J., Holt, J., Hale, J. M., Roberson, P., Burlacu, R., Pechmann, J. C., Whidden, K., **Holt, M. M.**, Allam, A., and DuRoss, C. (2020). Seismic analysis of the 2020 Magna, Utah, earthquake sequence: Evidence for a listric Wasatch fault, *Geophysical Research Letters*, 47, 1–10, <https://doi.org/10.1029/2020GL089798>.
- Voyles, J. R., **Holt, M. M.**, Hale, J. M., Koper, K. D., Burlacu, R., and Chambers, D. J. A. (2020). A new catalog of explosion source parameters in the Utah region with application to M_L – M_c -based depth discrimination at local distances, *Seismological Research Letters*, 91, 222–236, <https://doi.org/10.1785/0220190185>.
- Holt, M. M.**, Koper, K. D., Yeck, W., D’Amico, S., Li, Z., Hale, J. M., and Burlacu, R. (2019). On the portability of M_L – M_c as a depth discriminant for small seismic events recorded at local distances, *Bulletin of the Seismological Society of America*, 109, 1661–1673, <https://doi.org/10.1785/0120190096>.

- Quinones, L., DeShon, H. R., Jeong, S., Ogwari, P., Sufri, O., **Holt, M. M.**, and Kwong, K. B. (2019) Tracking induced seismicity in the Fort Worth Basin: A summary of the 2008–2018 North Texas earthquake study catalog, *Bulletin of the Seismological Society of America*, *109*, 1203–1216, <https://doi.org/10.1785/0120190057>.
- Park, J., Che I.-Y., Stump, B., Hayward, C., Dannemann, F., Jeong S., Kwong, K., McComas, S., Oldham, H., **Scales, M.**, and Wright, V. (2018). Characteristics of infrasound signals from North Korean underground nuclear explosions on January 6 and September 9 2016, *Geophysical Journal International*, *214*, 1865–1885, <https://doi.org/10.1093/gji/ggy252>.
- Scales, M. M.**, DeShon, H. R., Magnani, M. B., Walter, J. I., Quinones, L., Pratt, T. L., and Hornbach, M. J. (2017). A decade of induced slip on the causative fault of the 2015 M_w 4.0 Venus earthquake, northeast Johnson County, Texas, *Journal of Geophysical Research: Solid Earth*, *122*, 7879–7894, <https://doi.org/10.1002/2017JB014460>.
- Hornbach, M. J., Jones, M., **Scales, M.**, DeShon, H. R., Magnani, M. B., Frohlich, C., Stump, B., Hayward, C., and Layton, M. (2016). Ellenburger wastewater injection and seismicity in North Texas, *Physics of the Earth and Planetary Interiors*, *261*, 54–68, <https://doi.org/10.1016/j.pepi.2016.06.012>.

CONFERENCE PRESENTATIONS

- Holt, M. M.**, Koper, K. D., Pyle, M. L., Walter, W. R. (2022). M_L : M_c applied to nuclear explosions detonated at the Nevada Test Site. *SSAAM, 2022*, submitted.
- Holt, M. M.**, Koper, K. D. (2021). The calibration and optimization of M_L – M_c as a depth discriminant. *AGUFM, 2021*, S15C–0268.
- Holt, M. M.**, Baker, B., Pechmann, J., Koper, K., Farrell, J. (2021). Focal mechanisms for the 2020 Magna, Utah Earthquake Sequence Using Manual and Deep-Learning First Motions from a Temporary Large–N Array and Permanent Seismic Network. *SSAAM, 2021*.
- Lerback, J. C., Putman, A., **Holt, M. M.**, Pierre, G. S. (2020). A resilience framework supports the retention and success of diverse talent. *AGUFM, 2020*.
- Voyles, J. R., Pitarka, A., Koper, K. D., and **Holt, M. M.** (2019). Simulated Effects of Shallow Crustal Heterogeneity, Surface Topography, and Seismic Source Depth on Coda Wave Generation for Magnitude–Based Depth Discrimination. *AGUFM, 2019*, S11E–0417.
- Armstrong, A. D., **Scales, M. M.**, Koper, K. D., and Burlacu, R. (2018). High–precision Relative Relocation of Seismicity Near a Central Utah Mine. *AGUFM, 2018*, S33C–0604.
- Voyles, J. R., **Scales, M. M.**, Hale, J. M., Koper, K. D., Pechmann, J. C., and Burlacu, R. (2018). Test of a Magnitude–Based Depth Discriminant Using Revised Magnitudes and Locations of Explosions in the Utah Region, USA. *AGUFM, 2018*, S53E–0452.
- Scales, M. M.**, Li, Z., Hale, J. M., Koper, K. D., Pechmann, J. C., Burlacu, R., Voyles, J. R., and D'Amico, S. (2018). On the Performance of M_L – M_c as a Depth Discriminant for Small Seismic Events Recorded at Local Distances in Yellowstone, Oklahoma, and Italy. *AGUFM, 2018*, S53E–0450.
- Scales, M. M.**, Voyles, J. R., Hale, J. M., Koper, K. D., Burlacu, R., Pechmann, J. C. (2018). Further development and testing of M_L – M_c as a depth discriminant at local distances, *SSAAM, 2018*.
- DeShon, H. R., Brudzinski, M., Frohlich, C., Hayward, C., Jeong, S., Hornbach, M. J., Magnani, M. B., Ogwari, P., Quinones, L., **Scales, M. M.**, and Stump, B. W. (2017). One Basin, One Stress Regime, One Orientation of Seismogenic Basement Faults, Variable Spatio–

- Temporal Slip Histories: Lessons from Fort Worth Basin Induced Earthquake Sequences. *AGUFM*, 2017, S14A–08.
- Sufri, O., DeShon, H. R., **Scales, M. M.**, Hayward, C., and Magnani, M. B. (2016). Imaging crustal structure using local earthquake and ambient noise tomography in North Texas. *AGUFM*, 2016, S43C–2882.
- Scales, M. M.**, Baker, G. E., and Slinkard, M. (2016). Investigating the relationship between waveform correlation and seismic source mechanisms. *AGUFM*, 2016, S31A–2712.
- DeShon, H. R., Hayward, C., **Scales, M. M.**, Magnani, M. B., Hornbach, M. J., and Stump, B. W. (2015). Comparison study between North Texas Earthquake sequences from 2008–2015. *AGUFM*, 2015, S21C-06.
- Scales, M. M.**, DeShon, H. R., Hayward, C., Magnani, M. B., Walter, J. I., and Pratt, T. L. (2015). Characterization of the 2015 M4.0 Venus, Texas, earthquake sequence using locally recorded seismic data. *AGUFM*, 2015, S13B–2809.
- Quinones, L. A., DeShon, H. R., **Scales, M. M.**, and Hayward, C. (2015). Characterization of the 2015 Dallas–Irving Earthquake Sequence. *AGUFM*, 2015, S13B–2808.