

Alexander J. Evans

Curriculum Vitae

Lunar and Planetary Laboratory
University of Arizona
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RESEARCH INTERESTS

Statistical, predictive, and analytical modeling of global-scale tectonic, geodynamic, and geophysical processes; analyses of altimetry, gravity, geomorphology, and tectonics to determine the structure and internal evolution of solid planets; geobiology and microbiology work focused on understanding the evolution of early life on Earth.

EMPLOYMENT

Brown University – Dept. of Earth, Env. and Planetary Sci. (Providence, RI) *starting* July 2018
Assistant Professor of Earth, Environmental, and Planetary Sciences

University of Arizona – Lunar and Planetary Lab. (Tucson, AZ) January 2017 – July 2018
Postdoctoral Research Associate; Advisor: Prof. Jeffrey C. Andrews-Hanna

Southwest Research Institute – Planetary Sci. Dir. (Boulder, CO) January 2016 – January 2017
Postdoctoral Researcher; Advisor: Jeffrey C. Andrews-Hanna

Colorado School of Mines – Department of Geophysics (Golden, CO) October 2015 – January 2016
Postdoctoral Researcher; Advisor: Prof. Jeffrey C. Andrews-Hanna

Columbia University – Lamont-Doherty Earth Obs. (Palisades, NY) October 2013 – October 2015
Postdoctoral Research Scientist; Advisor: Director Sean C. Solomon

Massachusetts Institute of Technology (Cambridge, MA) July 2007 – September 2013
Research Assistant and Postdoctoral Research Associate; Advisor: Prof. Maria T. Zuber

NASA Jet Propulsion Laboratory (Pasadena, CA) November 2006 – December 2007
Lunar and Mars Mission Concepts – Systems Engineer

Ball Aerospace and Technologies Corporation (Washington, DC) May 2006 – August 2006
Legislative Affairs (Intern)

The Boeing Company – Integrated Defense Systems (Houston, TX) May 2005 – August 2005
NASA Launch Systems, Space Shuttle Ascent – Guidance, Navigation, and Control (Intern)

EDUCATION

Massachusetts Institute of Technology (Cambridge, MA) July 2007 – September 2013
Department of Earth, Atmospheric and Planetary Sciences
Doctor of Philosophy in Planetary Geophysics; Advisor: Vice President and Prof. Maria T. Zuber
Thesis: “Geophysical Evolution of Planetary Interiors and Surfaces: Moon and Mars”
Master of Science in Geobiology; Advisor: Prof. Tanja Bosak
Thesis: “Characteristics of Cone-forming Cyanobacteria and Implications for the Origin of Conical Stromatolites”

University of Michigan (Ann Arbor, MI) August 2002 – May 2006
Department of Aerospace Engineering
Bachelor of Science in Engineering – Aerospace Engineering

MISSION INVOLVEMENT

- Mercury, Surface, Space Environment, Geochemistry, and Ranging (MESSENGER) – Participant in science team meetings, 2013–2016

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- Gravity Recovery and Interior Laboratory (GRAIL) – Participant in science team meetings, 2007–2016
- Lunar Reconnaissance Orbiter (LRO) Lunar Orbiter Laser Altimeter (LOLA) – Participant in science team meetings, 2007–2016

RESEARCH TOOLS

- Numerical modeling
 - Predictive modeling
 - Parallel processing
 - Finite element modeling of thermochemical convection
 - Finite element modeling of viscoelastic deformation
 - Spherical harmonic analysis of gravity and topography data applied to problems of planetary loading and crustal structure
 - Spatospectral localization of global datasets
 - Programming in C, FORTRAN and MATLAB
- Data analysis
 - Gravity, topography, image, and spectral data
- Laboratory
 - Collection of biological samples from field environments
 - Extraction and analysis of RNA, DNA, proteins, and chlorophyll

TEACHING

- Origin and History of the Moon: Core to Crust. The Paradigm for Lunar Formation and Evolution (Rutgers 2017, Guest Lecturer)
- How to Build a Solar System: Physics, Chemistry and Biology of Formation (MS Governor's School 2015, Course Instructor)
- Geodynamics (MIT/WHOI Spring 2010, 2012, 2013, Guest Lecturer)
- Essentials of Geobiology (MIT Fall 2012, Teaching Assistant)
- Physics and Chemistry of the Terrestrial Planets (MIT Fall 2009, Teaching Assistant)
- Building Earth-like Planets (MIT Fall 2008, Guest Lecturer)
- Asteroids and Small Bodies (MIT Fall 2007, Guest Lecturer)

FIELD WORK

- Glaciers and Volcanism – France, Iceland, 2013
- Gravity and Volcanism – Hawai'i, 2012
- Crust and Mantle Boundary – France, Italy, Switzerland, 2010
- Conical Stromatolites in Cyanobacterial Communities – Yellowstone National Park, 2009
- Crater Analysis – Meteor Crater, Arizona, 2008
- Geological Mapping – Arizona, 2008

STUDENT MENTORING

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|--|--------------|-----------|
| • Sharon Newman (PhD student, MIT) | Geobiology | 2013–2014 |
| • Marie Giron (MS student, MIT) | Geochemistry | 2012–2013 |
| • Stephen Messenger (PhD student, MIT) | Exoplanets | 2010–2013 |

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| • *Xinchi Yin (visiting undergraduate, MIT) | Geobiology and microbiology | 2012 |
| • Michael Sori (PhD student, MIT) | Lunar geomorphology | 2009–2011 |
| • Renyu Hu (PhD student, MIT) | Exoplanets | 2009–2011 |
| • *B. Dylan Bannon (undergraduate, MIT) | Geobiology and microbiology | 2009–2010 |
| • Kate Harris (MS student, MIT) | Geobiology | 2009 |

*Acted in primary research advisor capacity

HONORS AND AWARDS

- Columbia University, Provost's Postdoctoral Research Scholar, 2013–2015
- National Association of Graduate-Professional Students, Lifetime Achievement Award, 2011
- Massachusetts Institute of Technology Presidential Fellow Award, 2007–2008
- University of Michigan Outstanding Student Leader, Honorable Mention, 2006
- University of Michigan Dean's List and University Honors, 2003–2006
- University of Michigan ScholarPOWER Banquet, Honoree, 2002–2006
- University of Michigan Aerospace Engineering Landes Class Prize in Technical Communications, 2004

UNIVERSITY ACTIVITIES AND SERVICE

- University of Arizona LPL, Committee for Red Team Proposal Reviews, *Member*, 2017–2018
- University of Arizona LPL, *Postdoctoral Representative to Faculty*, 2017–2018
- MIT Student Advisory Committee on Presidential Search, *Member*, 2012
- MIT Joint Student Task Force on Presidential Search, *Co-Chair*, 2012
- MIT Corporation Joint Advisory Committee, *Member*, 2011–2012
- MIT Institute Faculty Meetings, 2011–2012
- MIT Graduate Student Council, *President*, 2011–2012
- MIT Office of the Dean for Graduate Education Advisory Board, *Member*, 2011–2012
- MIT Graduate Student Council - Student Space Task Force, *Co-Chair*, 2010–2012
- MIT Walker Memorial Assessment Task Force, *Co-Chair*, 2010–2012
- MIT Committee on Graduate Programs, *Member*, 2009–2011
- MIT Graduate Student Council, *Chair of Legislative Action*, 2008–2011
- MIT EAPS Graduate Student Advisory Council, *President*, 2008–2009
- MIT Committee on Student Life, *Member*, 2008–2009
- MIT Graduate Student Council, *Chair of Community Engagement Task Force*, 2008–2009
- Sigma Gamma Tau (Aerospace Honor Society), *Member*, 2005–Present
- The Epeians (Leadership Honor Society), *Member*, 2004–Present
- Students for Exploration and Development of Space (UMSEDS), *Co-Founder*, 2005–2006
- University of Michigan Engineering Council (UMEC), *President*, 2005–2006
- University of Michigan Engineering Council (UMEC), *Director of University Relations*, 2003–2005

PROFESSIONAL ACTIVITIES AND SERVICE

- American Association for the Advancement of Science (AAAS), *Member*, 2012–Present
- American Geophysical Union (AGU), *Member*, 2012–Present
- Lunar and Planetary Science Conference, *Session Co-Chair*, 2017.
- International Music by Women Festival, *Media and Publications Coordinator*, 2017

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- Deutsche Forschungsgemeinschaft (German Research Foundation), *Proposal Reviewer*, 2015
- American Geophysical Union (AGU) Session 7177: Judging a Book by its Cover: From surface observations to planetary interiors, *Primary Convener*, 2015
- NASA, *Proposal Reviewer*, 2014–2015
- Student Mentoring, 2009–2014
- Boston Graduate Leadership Organization, 2010–2013
- Geological Society of America (GSA), *Member*, 2010–2012
- Ivy+ Graduate Summit, *Host and Organizer*, 2011–2012
- US-Russia Kremlin Fellows Program, *Fellow*, 2011
- Public Talk for Boston Debate League – Public School Outreach, 2011
- MIT Open House – Outreach on Planetary Science, 2011
- National Association of Graduate-Professional Students (NAGPS), *Immediate Past President*, 2010–2011
- National Association of Graduate-Professional Students (NAGPS), *National Conference Director*, 2010
- National Association of Graduate-Professional Students (NAGPS), *President and CEO*, 2009–2010
- National Association of Graduate-Professional Students (NAGPS), *Ombudsman*, 2009
- National Association of Graduate-Professional Students (NAGPS), *Regional Conference Comm.*, 2009
- NASA Jet Propulsion Laboratory – Public School Outreach, 2006
- National Association of Engineering Student Councils (NAESC), *National Vice President*, 2005–2006
- National Association of Engineering Student Councils (NAESC), *Regional Vice President*, 2003–2005

PUBLICATIONS

- Evans, A. J.**, J. C. Andrews-Hanna, A. J. Soto (*in preparation*), Climate Controlled Volcanism on Mars.
- Evans, A. J.**, S. M. Brown, B. Charlier, T. L. Grove, P. B. James, and S. C. Solomon (*in preparation*), Mercurian Interior Evolution and Link to Volcanic Plains Emplacement.
- Evans, A. J.**, J. C. Andrews-Hanna, J. M. Soderblom, J. W. Head III, S. C. Solomon, and M. T. Zuber (*submitted*), Re-Examination of Early Lunar Chronology: Terranes, Basins, and Impactor Distributions from Buried Craters Revealed by GRAIL Data, *J. Geophys. Res. Planets*.
- Evans, A. J.**, S. M. Tikoo, and J. C. Andrews-Hanna (2018), The Case Against an Early Lunar Dynamo Powered by Core Convection, *Geophys. Res. Lett.*, 45, 98–107, doi:10.1002/2017GL075441.
- Evans, A. J.** (2017), The GRAIL Mission, In *Encyclopedia of Lunar Science*, edited by B. Cudnik, Springer International Publishing, Cham.
- Byrne, P. K., L. R. Ostrach, C. I. Fassett, C.R. Chapman, B. W. Denevi, **A. J. Evans**, C. Klimczak, M. E. Banks, J. W. Head, and S. C. Solomon (2016), Widespread Effusive Volcanism on Mercury Likely Ended by About 3.5 Ga, *Geophys. Res. Lett.*, 43, doi:10.1002/2016GL069412.
- Evans, A. J.**, J. M. Soderblom, J. C. Andrews-Hanna, and M. T. Zuber (2016), Identification of Buried Lunar Impact Craters from GRAIL Data and Implications for the Nearside Maria, *Geophys. Res. Lett.*, 43, doi:10.1002/2015GL067394.
- Soderblom, J. M., **A. J. Evans**, R. J. Phillips, J. C. Andrews-Hanna, H. J. Melosh, K. Miljković, F. Nimmo, D. E. Smith, S. C. Solomon, M. M. Sori, M. A. Wieczorek, and M. T. Zuber (2015), The fractured Moon: Production and saturation of porosity in the lunar highlands from impact cratering, *Geophys. Res. Lett.*, doi:10.1002/2015GL065022.
- Evans, A. J.**, M. T. Zuber, B. P. Weiss, and S. M. Tikoo (2014), A Wet, Heterogeneous Lunar Interior: Lower Mantle and Core Dynamo Evolution, *J. Geophys. Res. Planets*, 119, 1061–1077, doi:10.1002/2013JE004494.

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- Bosak, T., S. P. Templer, T.-D. Wu, B. Liang, J.-L. Guerquin-Kern, J. Mui, H. Vali, **A. J. Evans**, M.S. Sim, J. Friedman, V. Klepac-Ceraj (2012), Cyanobacterial Activity and Composition in Modern Conical Stromatolites, *Geobiology*, 10, 5, p384-401, doi:10.1111/j.1472-4669.2012.00334.x.
- Sim, M. S., B. Liang, A. P. Petroff, **A. J. Evans**, V. Klepac-Ceraj, D. T. Flannery, M. R. Walter, and T. Bosak, (2012). Oxygen-Dependent Morphogenesis of Modern Clumped Photosynthetic Mats and Implications for the Archean Stromatolite Record. *Geosciences*, 2(4), 235259. doi: 10.3390/geosciences2040235;
- Evans, A. J.**, J. C. Andrews-Hanna, and M. T. Zuber (2010), Geophysical Limitations on the Erosion History within Arabia Terra, *J. Geophys. Res.*, 115, E05007, doi:05010.01029/02009JE003469.
- Sturm II, E. J., M. Deutsch, C. Harmon, R. Nakagawat, R. Kinsey, N. Lopez, P. Kurdle, and **A. J. Evans** (2007), Mission Options Scoping Tool for Mars Orbiters: Mass-Cost Calculator, Jet Propulsion Laboratory, National Aeronautics and Space Administration, 2007.

SELECTED INVITED PRESENTATIONS

- Evans, A. J.** (2018), Early History of Rocky Worlds: Moon and Mercury, Department of Sciences and Mathematics, Mississippi University for Women, Columbus, MS.
- Evans, A. J.** (2018), Structures of Rocky Worlds, Mississippi School for Mathematics and Sciences, Columbus, MS.
- Evans, A. J.** (2017), Structures of Rocky Worlds, Department of Earth, Environmental and Planetary Sciences, Brown University, Providence, RI.
- Evans, A. J.** (2017), Early History of the Moon: Crust to Core. Insights from the LOLA and GRAIL Investigations, Department of Earth, Environmental and Planetary Sciences, Brown University, Providence, RI.
- Evans, A. J.** (2017), Early History of the Moon and Mercury: Merging Magma Ocean Models with GRAIL and MESSENGER Data, Division of Geological and Planetary Sciences, California Institute of Technology, Pasadena, CA.
- Evans, A. J.** (2017), Early History of the Moon and Mercury: Merging Magma Ocean Models with GRAIL and MESSENGER Data, Northwestern University, Evanston, IL.
- Evans, A. J.** (2016), Merging Magma Ocean Theory with GRAIL and MESSENGER Data, NASA Jet Propulsion Laboratory, Pasadena, CA.
- Evans, A. J.** (2016), Insights into Early Lunar History using the GRAIL and LRO Missions, Intellectual Ventures, Bellevue, WA.

PRESENTATIONS AND ABSTRACTS

- Evans, A. J.** and J. C. Andrews-Hanna (2018), Mars Habitability and the Significance of Obliquity-Driven Coupling of Magmatism and Ice Deposition: A Case Study at Olympus Mons, 49th Lunar and Planetary Science Conference, Houston, TX.
- Evans, A. J.**, S. M. Tikoo, and J. C. Andrews-Hanna (2018), The Lunar Core Dynamo Energy Dilemma, 49th Lunar and Planetary Science Conference, Houston, TX.
- Evans, A. J.** (2017) The Divergent Evolution of Rocky Worlds, Lunar and Planetary Laboratory, University of Arizona, Tucson, AZ.
- Evans, A. J.**, J. C. Andrews-Hanna, J. M. Soderblom, S. C. Solomon, and M. T. Zuber (2017), Insights into Early Lunar Chronology from GRAIL Data, 48th Lunar and Planetary Science Conference, Houston, TX.
- Evans, A. J.** (2016), Merging Magma Ocean Theory with GRAIL and MESSENGER Data, Southwest Research Institute, Boulder, CO.

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- Evans, A. J.**, J. C. Andrews-Hanna, J. M. Soderblom, S. C. Solomon, and M. T. Zuber (2016), Re-Examination of Early Lunar Chronology: Terranes, Basins, and Impactor Distributions from Buried Craters Revealed by GRAIL Data, Spring Science Team Meeting of Gravity Recovery and Interior Laboratory (GRAIL) and Lunar Orbiter Laser Altimetry (LOLA), Southwest Research Institute, Boulder, CO.
- Kiefer W. S., J. C. Andrews-Hanna, **A. J. Evans**, J. W. Head III, I. Matsuyama, P. J. McGovern, F. Nimmo, J. M. Soderblom, M. M. Sori, G. J. Taylor, R. C. Weber, M. A. Wieczorek, J. G. Williams, and M. T. Zuber (2016), GRAIL Mission Constraints on the Thermal Structure and Evolution of the Moon, New Views of the Moon 2, Houston, TX.
- Evans, A. J.** and J. C. Andrews-Hanna (2016), Influence of Basin Impact Heating on Viscous Relaxation of Topography and Thermal Interior State, 47th Lunar and Planetary Science Conference, Houston, TX.
- Byrne, P. K., C. I. Fassett, C. Klimczak, L. R. Ostrach, C. R. Chapman, B. W. Denevi, A. M. Celâl Şengör, S. A. Hauck II, **A. J. Evans**, M. E. Banks, T. R. Watters, J. W. Head, and S. C. Solomon (2016), The Interplay Between Volcanism and Tectonics on Mercury, 47th Lunar and Planetary Science Conference, Houston, TX.
- Evans, A. J.**, S. M. Brown, B. Charlier, T. L Grove, P. B. James, and S. C. Solomon (2015), Effects of a Compositionally Stratified Mantle: Link to Early Volcanism on Mercury, Fall Meeting of the American Geophysical Union, San Francisco, CA.
- Byrne, P. K., L. R. Ostrach, C. I. Fassett, C. R. Chapman, **A. J. Evans**, Christian Klimczak, and S. C. Solomon (2015), Widespread Effusive Volcanism on Mercury Ended By 3.6 Ga, Fall Meeting of the American Geophysical Union, San Francisco, CA.
- Evans, A. J.**, S. M. Brown, B. Charlier, T. L Grove, P. B. James, and S. C. Solomon (2015), Mercurian Evolution –Early State of the Mantle and Magmatic Resurfacing, 35th MESSENGER Mission Science Team Meeting, Lamont-Doherty Earth Observatory, Columbia University, Palisades, NY.
- Evans, A. J.**, J. M. Soderblom, S. C. Solomon, and M. T. Zuber (2015), A Re-Examination of the Relative Ages of Mare-Filled Impact Basins on the Lunar Nearside from Gravity Signatures of Buried Craters, Workshop on Issues in Crater Studies and the Dating of Planetary Surfaces, Laurel, MD.
- Evans, A. J.**, S. M. Brown, and S. C. Solomon (2015), Characteristics of Early Mantle Convection and Melting on Mercury, 34th MESSENGER Mission Science Team Meeting, Carnegie Institution of Science – Department of Terrestrial Magnetism, Washington, DC.
- Soderblom, J. M., **A. J. Evans**, B. C. Johnson, H. J. Melosh, K. Miljković, R. J. Phillips, J. C. Andrews-Hanna, C. Milbury, G. A. Neumann, F. Nimmo, D. E. Smith, S. C. Solomon, M. M. Sori, C. J. Thomason, M. A. Wieczorek, and M. T. Zuber (2015), Probing the Structure and Porosity of the Lunar Highlands Crust, European Geosciences Union, Vienna, Austria.
- Evans, A. J.**, S. M. Brown, and S. C. Solomon (2015), Characteristics of Early Mantle Convection and Melting on Mercury, 46th Lunar and Planetary Science Conference, Houston, TX.
- Evans, A. J.**, J. M. Soderblom, S. C. Solomon, and M. T. Zuber (2014), Buried Lunar Craters: Re-Examination of Nearside Basin Ages and Maria Timing, Fall Science Team Meeting of Gravity Recovery and Interior Laboratory (GRAIL) and Lunar Orbiter Laser Altimetry (LOLA), National Academy of Sciences, Falmouth, MA.
- Evans, A. J.**, J. M. Soderblom, S. C. Solomon, and M. T. Zuber (2014), Crater Counts and Relative Ages for the Lunar Nearside, Spring Science Team Meeting of Gravity Recovery and Interior Laboratory (GRAIL) and Lunar Orbiter Laser Altimetry (LOLA), Boulder, CO.
- Evans, A. J.** (2014), Origin and History of the Moon: Core to Crust, Mississippi University for Women – Department of Sciences and Mathematics, Columbus, MS.
- Soderblom, J. M., **A. J. Evans**, R. J. Phillips, J. C. Andrews-Hanna, H. J. Melosh, C. Milbury, K. Miljković, G. A. Neumann, F. Nimmo, D. E. Smith, S. C. Solomon, M. M. Sori, M. A. Wieczorek, M.

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- T. Zuber (2014), Constraints on Impact-Induced Fracturing and Brecciation of the Lunar Crust from GRAIL, 45th Lunar and Planetary Science Conference, Houston, TX.
- Evans, A. J.** (2014), Insights into Early Lunar History using GRAIL and LOLA, Columbia University, New York, NY.
- Evans, A. J.** and M. T. Zuber (2013), Identification of Buried Craters without Surface Expression, Fall Meeting of the American Geophysical Union, San Francisco, CA.
- Evans, A. J.** (2013), Early Lunar History: Implications for Interior and Surface Evolution, Massachusetts Institute of Technology – Department of Earth, Atmospheric and Planetary Sciences, Cambridge, MA.
- Evans, A. J.**, J. M. Soderblom, and M. T. Zuber (2013), Buried Lunar Craters, Fall Science Team Meeting of Gravity Recovery and Interior Laboratory (GRAIL) and Lunar Orbiter Laser Altimetry (LOLA), National Academy of Sciences, Falmouth, MA.
- Evans, A. J.**, J. M. Soderblom, and M. T. Zuber (2013), Buried Lunar Craters, Summer Science Team Meeting of Gravity Recovery and Interior Laboratory (GRAIL) and Lunar Orbiter Laser Altimetry (LOLA), Brown University, Providence, RI.
- Smith, D. E., M. T. Zuber, G. A. Neumann, E. Mazarico, J. W. Head III, **A. J. Evans**, M. A. Wieczorek, S. J. Goossens, J. C. Andrews-Hanna, J. M. Soderblom, and W. S. Kiefer (2013), GRAIL gravity field of the lunar south polar region, 44th Lunar and Planetary Science Conference, Houston, TX.
- Evans, A. J.**, M. T. Zuber, and B. P. Weiss (2013), The Possible Role of Water in Sustaining a Lunar Core Dynamo, 44th Lunar and Planetary Science Conference, Houston, TX.
- Evans, A. J.**, M. T. Zuber, and B. P. Weiss (2013), The Possible Role of Water in Sustaining a Lunar Core Dynamo, Winter Science Team Meeting of Gravity Recovery and Interior Laboratory (GRAIL) and Lunar Orbiter Laser Altimetry (LOLA), Irvine, CA.
- Evans, A. J.** and M. T. Zuber (2012), Viscoelastic Relaxation Modeling of Lunar Basins, Summer Science Team Meeting of Gravity Recovery and Interior Laboratory (GRAIL) and Lunar Orbiter Laser Altimetry (LOLA), Paris, France.
- Evans, A. J.** and M. T. Zuber (2012), The Possible Role of Water in the Early Thermal Evolution of the Moon, 43rd Lunar and Planetary Science Conference, Houston, TX.
- Evans, A. J.**, J. C. Andrews-Hanna, and M. T. Zuber (2009), Quantitative Constraints on Surface Erosion via Admittance Localization for Arabia Terra, 40th Lunar and Planetary Science Conference, Houston, TX.
- Evans, A. J.**, J. C. Andrews-Hanna, and M. T. Zuber (2008), Lithospheric Flexure as a Consequence of Possible Erosion within Arabia Terra, 39th Lunar and Planetary Science Conference, Houston, TX.