John M. Keller

University of Colorado
Boulder, CO 80309

Astrophysical and Planetary Sciences
Fiske Planetarium

EDUCATIONAL PREPARATION

2006 **University of Arizona**, PhD Planetary Science.
Dissertation: Part I: Greenhouse Effect Concept Inventory, Part II: Distribution of Chlorine Measured by the Mars Gamma Ray Spectrometer. Advisors: Dr. William V. Boynton and Dr. Edward E. Prather.

1999 **University of Colorado**, MS Astrophysics and Planetary Sciences.
Research Focus: Astronomy Education. Advisors: Dr. Katherine Garmany, Dr. Clark Chapman.

1992 **Stanford University**, MA Education.
Earned California Single Subject Teacher Credentials in Physical Science and Life Science.

1991 **Stanford University**, BS Biological Sciences.
Attended Stanford Overseas Studies Programme in Oxford with focus on History of Science.

EMPLOYMENT

Director, Fiske Planetarium
University of Colorado, Boulder, CO, 1/2018-present

Teaching Professor of Distinction, Astrophysical and Planetary Sciences
University of Colorado, Boulder, CO, 5/2022-present

Associate Teaching Professor, Astrophysical and Planetary Sciences
University of Colorado, Boulder, CO, 1/2018-present

Professor Emeritus
California Polytechnic University, San Luis Obispo, CA, 1/2021-present.

Professor (on professional leave)
California Polytechnic University, San Luis Obispo, CA, 9/2018-12/2020.

Co-Director, Center for Excellence in Science and Mathematics Education (CESaME)
California Polytechnic University, San Luis Obispo, CA, 1/2010-12/2017.

Associate Professor
California Polytechnic University, San Luis Obispo, CA, 9/2012-9/2018.

Assistant Professor
California Polytechnic University, San Luis Obispo, CA, 1/2007-9/2012.

Research Associate/Teaching Associate
Lunar and Planetary Laboratory, University of Arizona, Tucson, AZ, 10/2001 – 12/2006.

Astronomy Education Coordinator
Desert Sun Science Center, Idyllwild, CA, 7/1999-10/2001 & 8/1997-6/1998.

Research Assistant/Teaching Assistant
University of Colorado, Boulder, CO, 8/1996-5/1997 & 8/1998-5/1999.

Science Teacher
Los Altos High School, Los Altos, CA, 8/1991-6/1996.

SELECTED PUBLICATIONS

Keller, J.M., S. Buxner, D. Donnelly-Hermosillo, E. Bailey, M. Citkowicz, L. Horvath, D. Moreno, M. Yisak, B. Zhu, E. Fulbeck, D. Sessoms, S. Vokos, C. Chen, and M. Pardo (2025), "Impact of Teachers With Research Experiences: Student Gains in STEM Career Awareness, Perception of Value of STEM Learning, and Persistence in STEM Course Tasks," *Science Education*, 2025 January, doi: 10.1002/sce.21926.

Chambers, L., Connolly, R., Kirk, M. S., Fischer, H., Aranda, A., Bowden, M. L., Cass, M., Cominsky, L. R., Czajkowski, K. P., Edson, L. B., Gardner-Vandy, K., Higdon, R., Holland, A., **Keller, J. M.,** Kohl, H., Leavell, C., MacDonald, E., McCarthy, C., Mead, C., … and White, V. (2025). "Uniting Under the Eclipse: A Mega-Collaboration to Activate Science Learning Across the Penumbra and Beyond." *Bulletin of the AAS*, 57. https://doi.org/10.3847/25c2cfeb.52359797

Buie, M.W., H. AlMazmi**,** P. Hayne, A. Marciniak**,** B.A. Keeney, F. Alawadhi**,** A. Almansoori**, N**. Rashed Alsaeed**,** A.S. Alsawwafi, A.J. Aradhya**,** D. Baker**,** S.F.A. Cartwright, E. David, H.M. Davidson, I. Faber, C. Ferrell, W.G. Ferrell, K. Getrost, J. Hammerl, P. Hinton, J.L. Jewell, R.L. Kamin, **J.M. Keller**, M. Lefevre, S. Messner, V. Nikitin, H. Pieris, A. Prakash, J. Salmon, A.E. Sharif, M. Skrutskie, K.C. Sorli, T. Teil, A.J. Verbiscer, and J.Villa. (2025) "Occultation-based Size and Shape of (269) Justitia." *The Planetary Science Journal*, Volume 6, Issue 3.

Buie, M.W., **J.M. Keller**, D. Nesvorny, and S.B Porter. (2025) "Occultation constraints on solar system formation models." *Philos Trans A Math Phys Eng Sci* 27 February 2025; 383 (2291): 20240194. https://doi.org/10.1098/rsta.2024.0194.

Keller, J.M., S. Buxner, D. Donnelly-Hermosillo, E. Bailey, M. Citkowicz, L. Horvath, D. Moreno, M. Yisak, B. Zhu, E. Fulbeck, D. Sessoms, S. Vokos, C. Chen, and M. Pardo (2025), "Impact of Teachers With Research Experiences: Student Gains in STEM Career Awareness, Perception of Value of STEM Learning, and Persistence in STEM Course Tasks," *Science Education*, 2025 January, doi: 10.1002/sce.21926.

Pereira, C. L., B. Sicardy, B.E. Morgado, F. Braga-Ribas, E. Fernandez-Valenzuela, D. Souami, B.J. Holler, R.C. Boufleur, G. Margoti, M. Assafin, J.L. Ortiz, P. Santos-Sanz, B. Epinat, P. Kervella, J. Desmars, R. Vieira-Martins, Y. Kilic, A.R. Gomes Junior, J.I.B. Camargo, M. Emilio, M. Vara-Lubiano, M. Kretlow, L. Albert, C. Alcock, J.G. Ball, K. Bender, M.W. Buie, K. Butterfield, M. Camarca, J.H. Castro-Chacon, R. Dunford, R.S. Fisher, D. Gamble, J.C. Geary, C.L. Gnilka, K.D. Green, Z.D. Hartman, C.K. Huang, H. Januszewski, J. Johnston, M. Kagitani, R. Kamin, J.J. Kavelaars, **J.M. Keller**, and 25 additional authors (2023), "The two rings of (50000) Quaoar," *Astronomy and Astrophysics*, 673, L4.

Buxner S, Vokos S, **Keller J**, Good C, Donnelly-Hermosillo D, Horvath L, Sessoms D, Bailey E, Citkowicz M, Yisak M, et. al. (2022), "Impacts of the STEM Teacher and Researcher (STAR) Program on Teachers,

Students, and Classrooms." in *Research in Practice: Preparing and Retaining K-12 STEM Teachers in High-Need School Districts*, American Association for the Advancement of Science, July 2022.

Everding, D., and **J.M. Keller** (2022), "Study of faculty instructors in undergraduate classroom and planetarium learning environments," *Journal of Astronomy and Earth Sciences Education, 8(1).*

Butler E., and **J.M. Keller** (2021), "R2O2R improvements identified by United States space weather forecasters." *Space Weather*, 19(6), DOI: 10.1029/2021SW002739.

Strauss, R., R. Leiva, **J.M. Keller**, E. Wilde, M.W. Buie, and 44 additional authors (2021), "The sizes and albedos of Centaurs 2014 YY49 and 2013 NL24 from stellar occultation measurements by RECON," *Planetary Science Journal*, 2(1), DOI: 10.3847/PSJ/abd62a.

Buie M, B. Keeney, R. Strauss, and 76 additional authors including **J.M. Keller** (2021), "Size and shape of (11351) Leucus from five occultations," *Planetary Science Journal*, 2(5), DOI: 10.3847/PSJ/ac1f9b.

Everding, D., and **J.M. Keller** (2020), "Survey of the academic use of planetariums for undergraduate education," *Physical Review Physics Education Research*, **16**(020128).

Leiva, R., M.W. Buie, **J.M. Keller**, R. Weryk, S.L. Haley, R. Strauss, E. Wilde, and 16 additional authors, (2020) " Stellar occultation by the resonant Trans-Neptunian Object (523764) 2014 WC510 reveals a close binary TNO." *Planetary Science Journal*, 1(48).

Buie, M.W., R. Leiva, **J.M. Keller**, J. Desmars, B. Sicardy, JJ Kavelaars, T. Bridges, R. Weryk, D. Herald, S.L. Haley, R. Strauss, E. Wilde, and 23 additional authors (2020), "A single-chord stellar occultation by the extreme TNO (541132) Leleākūhonua," *The Astronomical Journal*, 159(5): 230, doi.org/10.3847/1538-3881/ab8630.

Buie, M.W., S.B. Porter, P. Tamblyn, and 130 additional authors including **J.M. Keller** (2019), "Size and Shape Constraints of (486958) Arrokoth from Stellar Occultations," *The Astronomical Journal*, 159(4):130, doi.org/10.3847/1538-3881/ab6ced.

Krim J.S., L.E. Cote, R.S. Schwartz, E.M. Stone, J.J. Cleeves, K.J. Barry, W. Burgess, S.R. Buxner, J.M. Gerton, L. Horvath, **J.M. Keller**, S.C. Lee, S.M. Locke, and B.M. Rebar (2019), "Models and Impacts of Science Research Experiences: A Review of the Literature of CUREs, UREs, and TREs," CBE-Life Sciences Education, 18(4).

Trouille, L, T. Nelson, J. Feldt, **J. Keller**, M. Buie, C. Cardamone, B. Cobb Kung, K. Masters, K. Meredith, and K. Borden (2019), "Citizen Science in Astronomy Education," in *Astronomy Education Volume 1: Evidence based instruction for introductory courses*, ed. Chris Impey and Sanlyn Buxner, IOP Publishing, doi:10.1088/2514-3433/ab2b42.

G. Benedetti-Rossi, B. Sicardy, M. W. Buie, J. L. Ortiz, R. Vieira-Martins, **J. M. Keller**, and 23 additional authors (2016), "Results from the 2014 November 15th multi-chord stellar occultation by the TNO (229762) 2007 UK126," *The Astronomical Journal*, 152(6): 156.

Buie, M.W., and **J.M. Keller** (2016), "The Research and Education Collaborative Occultation Network: A system for coordinated TNO occultation observations," *The Astronomical Journal*, 151:73, doi:10.3847/0004-6256/151/3/73.

Baker, W., and **J.M. Keller** (2010), "Science Teacher and Researcher (STAR) Program: Strengthening STEM Education through Authentic Research Experiences for Preservice and Early Career Teachers," *Peer Review*, publication of the American Association of Colleges and Universities (AAC&U), Spring 2010, Vol 12, No 2, Pages 22-26.

Keller, J. M., Boynton, W. V., Karunatillake, S., Baker, V. R., Dohm, J. M., Evans, L. G., Finch, M. J., Hahn, B. C., Hamara, D. K., Janes, D. M., Kerry, K. E., Newsom, H. E., Reedy, R. C., Sprague, A. L., Squyres, S. W., Starr, R. D., Taylor, G. J., Williams, R. M. S. (2006), Equatorial and midlatitude distribution of chlorine measured by Mars Odyssey GRS, *J. Geophys. Res., 111,* E03S08, doi:10.1029/2006JE002679 [printed 112(E3), 2007].

FULL DOME FILMS

Executive Producer:
5000 Eyes: Mapping the Universe with DESI (English, Spanish, French, Mandarin)
Cosmic Mashups: Gravity, Galaxies, and Supermassive Black Holes (English and Spanish)
Worlds of Curiosity
Forward! To the Moon
Drifting North: Into the Polar Night
Drifting North: Arctic Pulse
Climate Change in Our Backyard
Science through Shadows Episode 1: Ring of Fire Eclipse
Science through Shadows Episode 2: Total Eclipse of the Sun
Science through Shadows Episode 3: Why Eclipses Occur
Science through Shadows Episode 4: Chasing Polymele's Shadow
Science through Shadows Episode 5: Humanity Touches the Sun
Science through Shadows Episode 6: The Sun Touches Humanity

Script Writer:
Science through Shadows Episode 4: Chasing Polymele's Shadow
Science through Shadows Episode 5: Humanity Touches the Sun
Science through Shadows Episode 6: The Sun Touches Humanity
Cosmic Mashups: Gravity, Galaxies, and Supermassive Black Holes
Forward! To the Moon
Kids in Space!

Consultant:
A New Perspective on Time and Humanity

EDUCATIONAL MATERIALS

Morrow, C.M., M. Zawaski, J. Aubele, I. Allf, N. Byers, D. Dooling, **J.M. Keller**, "NASA PUNCH Outreach Products," https://punch.space.swri.edu/punch_outreach_products.php.

Kornreich, S., **J. Keller**, and B. Ingermann, "Wave Induced Atmospheric Variability Enterprise (WAVE) Informal Education Activities for Middle School," https://lasp.colorado.edu/home/wave/broadening-impacts/.

Keller, J. M., S. Buxner, H. Enos, and W. V. Boynton, "Buried Water Ice on Mars Curriculum," accepted through NASA Education Review process and recommended for wide distribution.

Keller, J.M., J. Forde, W.V. Boynton, H. Enos (2005), "GRS Simulator," Web Animation, http://grs.lpl.arizona.edu/content/learning/simulator.

Keller, J.M., M. Quinn, J. Forde, W.V. Boynton, H. Enos (2004), "The Gamma Ray Spectrometer Measures Water and Carbon Dioxide Ice on Mars," Web Sonification, http://grs.lpl.arizona.edu/content/learning/sonif.

Pendleton, Y., **J.M. Keller**, L. Smith, J. Cruikshank, & C. Chang (1995), "Windows on Orion: A Multi-Wavelength View of the Stars," ExInEd Electronic Picturebooks, Association of Universities for Research in Astronomy, http://www.stsci.edu/exined-html/exined.home.html.

PROFESSIONAL HONORS AND LEADERSHIP ACTIVITIES

CU Arts and Sciences Faculty Senate DEI Committee ASCEND Award, 2025

Rocky Mountain Planetarium Association, President, September 2024-December 2025

Western Regional Noyce Network, Advisory Board Member, Fall 2022-Summer 2025

Astronomical Society of the Pacific, Board Member 2019-present, chair of Awards Committee starting 2021

Post-2021 Network Advisory Committee for 100Kin10, a national organization focused on preparing and retaining 100,000 STEM teachers over the decade

2016 Margaret Nicholson Distinguished Service Award, California Science Teachers Association

Cal Poly Certificate of Excellence: $5 Million in External Funding for Research, Fall 2015

Invited Guest at 100Kin10 White House Visit for Presidential Awards for Excellence in Mathematics and Science Teaching (PAEMST), July 2015

Advisory Board for APLU Science and Math Teacher Imperative, 2015-2018

Advisory Board for Western Regional Noyce Conference, Fall 2018-present

Advisory Board for Berkeley Undergrad Research Evaluation Tools (BURET), Spring 2019-Spring 2021