

## ***CURRICULUM VITAE***

***Mark S. Marley***

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### **Education**

Ph.D. in Planetary Sciences (1990)

Minor in Optical Sciences

The University of Arizona, Tucson

Thesis title: *Nonradial Oscillations of Saturn: Implications for Ring System Structure*

Advisor: Dr. William B. Hubbard

B.S. in Geophysics and Planetary Science (1984)

California Institute of Technology

### **Current Positions**

Research Scientist, NASA Ames Research Center (August 2000 - present)

Consulting Professor, Stanford University (2004 - present, teaching 1 course/calendar yr)

### **Previous Positions**

(May 1999 – August 2000) Assoc. Prof. of Astronomy, New Mexico State Univ.

(Jan. 1993 – April 1999) Assistant Professor of Astronomy, New Mexico State University

(February 1990 – Dec. 1992) National Research Council, Resident Research Associate

**Awards:** NASA Medal for Exceptional Scientific Achievement (2007, 2016), NASA H. Julian Allen Award for Outstanding Scientific Paper (2011), NASA Ames Associate Fellow (2016)

**Research Interests:** planetary atmospheres, jovian planets, extrasolar planets, and brown dwarfs

**NASA Mission Service of Note:** *LUVOIR* STDT, *WFIRST* SIT, *Exo-C* STDT, TPF-C STDT

**National Academies Decadal Survey Participation:** (1) Decadal Survey on Astronomy & Astrophysics 2020: Exoplanets, Astrobiology, and Solar System Panel, V. Meadows, Chair. (2) Planetary Science Decadal Survey 2013-2022: Giant Planets Panel, H. Hammel, Chair.

**Publications** Complete, searchable publication list available at <http://goo.gl/7MLV12>  
(232 refereed articles have received 16,100 citations, h-index=65 (per NASA ADS))

Smith, A. and 6 co-authors including M. Marley (2020) Detecting and Characterizing Water Vapor in the Atmospheres of Earth Analogs through Observation of the 0.94  $\mu\text{m}$  Feature in Reflected Light. *Astron. J.* **159**, 36.

- Sotzen, K. and 20 co-authors including M. Marley (2020) Transmission Spectroscopy of WASP-79b from 0.6 to 5.0  $\mu\text{m}$ . *Astron. J.* **159**, 5.
- de Rosa, R. and 53 co-authors including M. Marley (2020) An Updated Visual Orbit of the Directly Imaged Exoplanet 51 Eridani b and Prospects for a Dynamical Mass Measurement with Gaia. *Astron. J.* **159**, 1.
- de Rosa, R. and 7 co-authors including M. Marley (2019) The Possible Astrometric Signature of a Planetary-mass Companion to the Nearby Young Star TW Piscis Austrini (Fomalhaut B): Constraints from Astrometry, Radial Velocities, and Direct Imaging. *Astron. J.* **158**, 225.
- Beatty, T., Marley, M and 4 co-authors (2019) Spitzer Phase Curves of KELT-1b and the Signatures of Nightside Clouds in Thermal Phase Observations. *Astron. J.* **158**, 166.
- Morley, C. and 7 co-authors including M. Marley (2019) Measuring the D/H Ratios of Exoplanets and Brown Dwarfs. *Astrophys. J.* **882**, 29.
- Mankovich, C., Marley, M, Fortney, J., Movshovitz, N. (2019) Cassini Ring Seismology as a Probe of Saturn's Interior. I. Rigid Rotation. *Astrophys. J.* **871**, 1.
- Mayorga, L., Batalha, N., Lewis, N., Marley, M. (2019) Reflected Light Phase Curves in the TESS Era. *Astron. J.* **158**, 66.
- Nielsen, E. and 65 co-authors including M. Marley (2019) The Gemini Planet Imager Exoplanet Survey: Giant Planet and Brown Dwarf Demographics from 10 to 100 au. *Astron. J.* **158**, 13.
- Batalha, N., Marley, M, Lewis, N., and Fortney, J. (2019) Exoplanet Reflected-light Spectroscopy with PICASO. *Astrophys. J.* **878**, 70.
- Morley, C., Skemer, A., Allers, K., Marley, M. et al. (2018) An L Band Spectrum of the Coldest Brown Dwarf. *Astrophys. J.* **858**, 97.
- Feng, K., Robinson, T., Fortney, J., Lupu, R., Marley, M., Lewis, N., Macintosh, B., Line, M. (2018) Characterizing Earth Analogs in Reflected Light: Atmospheric Retrieval Studies for Future Space Telescopes. *Astron. J.* **155**, 200.
- Macdonald, R., Marley, M., Fortney, J., Lewis, N. (2018) Exploring H<sub>2</sub>O Prominence in Reflection Spectra of Cool Giant Planets. *Astrophys. J.* **858**, 2.
- Manjavacas, E. and 14 co-authors including M. Marley (2018) Cloud Atlas: Discovery of Rotational Spectral Modulations in a Low-mass, L-type Brown Dwarf Companion to a Star. *Astron. J.* **155**, 11.
- Zhou, Y. and 14 co-authors including M. Marley (2018) Cloud Atlas: Rotational Modulations in the L/T Transition Brown Dwarf Companion HN Peg B. *Astron. J.* **155**, 132.
- Gao, P., Marley, M., and Ackerman, A. (2018) Sedimentation Efficiency of Condensation Clouds in Substellar Atmospheres. *Astrophys. J.* **845**, 86.
- Hörst, S., Chao, H., Kempton, E., Marley, M., Morley, C., Moses, J., Valenti, J., Vuitton, V. (2018) Haze production rates in super-Earth and mini-Neptune atmosphere experiments. *Nature Astronomy*, **2**, 303.
- Line, M, Marley, M, et al. (2017) Uniform Atmospheric Retrieval Analysis of Ultracool Dwarfs. II. Properties of 11 T dwarfs. *Astrophys. J.* **848**, 83.
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- Evans, T. and 26 coauthors including M. Marley (2017) An ultrahot gas-giant exoplanet with a stratosphere. *Nature* **548**, 58.
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- Ruffio, J-B., Macintosh, B., Wang, J., Pueyo, L., Nielsen, E., De Rosa, R., Czekala, I., Marley, M., et al. (2017) Improving and Assessing Planet Sensitivity of the GPI Exoplanet Survey with a Forward Model Matched Filter. *Astrophys. J.* **842**, 14.
- Rameau, J., and 54 co-authors including M. Marley (2017) An Optical/Near-infrared Investigation of HD 100546 b with the Gemini Planet Imager and MagAO. *Astron. J.* **153**, 244.
- Johnson-Groh, M. and 52 co-authors including M. Marley (2017) Integral Field Spectroscopy of the Low-mass Companion HD 984 B with the Gemini Planet Imager. *Astron. J.* **153**, 190.
- Chilcote, J. and 63 co-authors including M. Marley (2017) 1-2.4  $\mu\text{m}$  Near-IR Spectrum of the Giant Planet  $\beta$  Pictoris b Obtained with the Gemini Planet Imager. *Astron. J.* **153**, 182.
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- Gao, P., Marley, M., Zahnle, K., Robinson, T., Lewis, N. (2017) Sulfur Hazes in Giant Exoplanet Atmospheres: Impacts on Reflected Light Spectra. *Astron. J.* **153**, 139.
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- Morley, C., Fortney, J., Marley, M., Zahnle, K., Line, M., Kempton, E., Lewis, N. & Cahoy, K. (2015) Thermal Emission and Reflected Light Spectra of Super Earths with Flat Transmission Spectra. *Astrophys. J.* **815**, 110.
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- Webber, M., Lewis, N., Marley, M., Morley, C., Fortney, J. & Cahoy, K. (2015) Effect of Longitude-dependent Cloud Coverage on Exoplanet Visible Wavelength Reflected-light Phase Curves. *Astrophys. J.* **804**, 94.
- Marley, M. & Robinson, T. (2015) On the cool side: Modeling the Atmospheres of brown dwarfs and giant planets. *Ann. Rev. Astron. & Astrophys.*, **53**, 279.
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- Casewell, S., Lawrite, K., Maxted, P., Marley, M., and 6 co-authors (2015) Multiwaveband photometry of the irradiated brown dwarf WD0137-349B. *MNRAS* **447**, 3218.
- Metchev, S. and 8 co-authors, including M. Marley (2015) Weather on Other Worlds. II. Survey Results: Spots are Ubiquitous on L and T Dwarfs. *Astrophysical J.* **799**, 154.
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- Yang, H., Apai, D., Marley, M., and 13 co-authors (2015) HST Rotational Spectral Mapping of Two L-type Brown Dwarfs: Variability in and out of Water Bands indicates High-altitude Haze Layers. *Astrophysical J.* **798**, 13.
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- Buenzli, E., Saumon, D., Marley, M., and 5 co-authors. (2015) Cloud Structure of the Nearest Brown Dwarfs: Spectroscopic Variability of Luhman 16AB from the Hubble Space Telescope. *Astrophysical J.* **798**, 127.
- Zahnle, K. and Marley, M. (2014) Methane, Carbon Monoxide, and Ammonia in Brown Dwarfs and Self-Luminous Giant Planets. *Astrophysical J.* **797**, 41.
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### **Conference Proceedings Edited**

- From Giant Planets to Cool Stars*, Astronomical Society of the Pacific Conference Series, Volume 212, Edited by Caitlin Griffith and Mark Marley

### **Selected Recent Doctorate Committee Membership**

- Zhoujian Zhang, Univ. of Hawaii Astronomy, 2020.
- Eric Nielsen, Stanford Astronomy, 2019.
- Christopher Mankovich, Univ. of Calif. Santa Cruz, 2018.
- Laura Mayorga, NMSU Astronomy, 2017.
- Caroline Morley, Univ. of Calif. Santa Cruz, 2016.

### **Selected Invited Talks (2014 to present)**

- July 30, 2020. Exoplanets III, Heidelberg Germany. *Where Should Exoplanet Atmosphere Theory be Headed Next?*
- July 29, 2018. Cool Stars 20 at Boston University. *A New Generation of Substellar Atmosphere & Evolution Models*

July 6, 2017. Kavli Symposium on Future of Exoplanetary Science at Institute of Astronomy at Cambridge Univ. *Don't Rain on my Science: The Challenge of Measuring Composition in Cloudy Atmospheres*

September 5, 2016. Kavli Symposium on Future of Exoplanetary Science at Institute of Astronomy at Cambridge Univ. *Directly Imaged Planets: Where do we go from Here?*

April 6, 2016. University of Exeter, Department of Astronomy. *Cold, Cloudy, and Hazy: Some New Results on Cool Substellar Atmospheres.*

March 31, 2016. UK Exoplanet Community Meeting. *Directly Imaged Planets: What do we Hope to Learn?*

February 9, 2016, California Institute of Technology, Division of Geological and Planetary Sciences. *Understanding the Directly Imaged Planets.*

May 7, 2014, Space Telescope Science Institute. *Understanding the Directly Imaged Young Jupiters: Where Has All the Methane Gone?*

### **Recent Marley NASA ROSES Grants**

*(Note that Civil Service scientists are precluded from applying for NSF funds)*

#### **Recent Grants as PI**

- Understanding the Directly Imaged Exoplanets (Exoplanets Research Program 2014) \$722,000. FY 2014-16.
- Chemistry and Clouds: Emerging Issues in Exoplanet Atmospheres (Planetary Atmospheres 2011) \$466,000. FY 2013-15.
- The Ascendancy of Youth: Young, Directly Imaged Planets as Tests of Planetary Formation and Evolution (Origins of Solar Systems 2011) \$449,000. FY 2012-14.
- Bright Earths: Models of the Post-Giant Impact Atmospheres of Young Terrestrial Planets (Origins of Solar Systems 2008) \$456,000. FY 2009-11.

#### **Notable Ongoing Co-I Grants**

- Rocky Planet Habitability: Insights from Solar System Climate Dynamics Through Time (NexSS Program). PI del Genio. FY 2015-19, 0.2 FTE / year for Marley.
- A Comprehensive View of Giant Planet Atmospheres in the JWST Era (Exoplanets Research Program 2018). PI Jonathan Fortney. FY 2019-21, 0.08 FTE / year for Marley.
- Optimizing WFIRST coronagraph science (WFIRST Science Investigation Teams and Adjutant Scientists). PI Macintosh (Stanford U.), FY 2015-20, 0.1 FTE / year for Marley.
- Back and Forth, Big and Small: Forward and Inverse Models of Super-Earth and Mini-Neptune Exoplanets. PI Robinson (NAU), FY 2017-20, 0.08 FTE / year for Marley
- A Community Tool for Computing, Visualizing, and Manipulating Molecular & Atomic Opacities (Unsolicited proposal). PI Lewis (Cornell), FY 2019-22, 0.05 FTE / year for Marley

- Laboratory measurement of opacities and pressure-induced line broadening parameters at exoplanetary atmospheric conditions. (Exoplanets Research Program 2019). PI. R. Hanson, Stanford, FY 2020-2022, 0.05 FTE / year for Marley

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