

Jesse Tarnas

324 Brook Street Box 1846
Providence RI, 02906

www.jessetarnas.com
jesse_tarnas@brown.edu

Education:

Brown University

PhD Student, Department of Earth, Environmental, and Planetary Sciences

Advisor: Prof. Jack Mustard

Committee Members: Prof. Ralph Milliken & Prof. Stephen Parman

Anticipate PhD completion in 2021

MA Planetary Geoscience '18

Awards: Graduate Travel Grant (2), SSERVI grant for 2017 Sudbury Field Camp, Mars Student Travel Grant for 4th Landing Site Workshop for the Mars 2020 Rover Mission

Wesleyan University

BA Physics '16

BA Astronomy '16 (Honors)

Minor in Planetary Science

Awards: CT Space Grant Undergraduate Directed Campus Scholarship, Howards Hughes Research Fellowship, THINK STEM Scholarship, William James & Dorothy Bading Lanquist Scholarship, CT Space Grant Travel Award.

Thesis: *Transit, Secondary Eclipse, and Phase Curve Analysis to Characterize Kepler Exoplanets.*

Research Experience:

Graduate Research Assistant, Jack Mustard Group, Brown University, Fall 2016 – Present

- Modeling radiolytic H₂ production, transportation, and dissolution on Mars during the Noachian.
- Serpentine Fe-oxidation state characterization using VNIR reflectance spectroscopy.
- Development of novel data analysis methods for hyperspectral datasets.
- Characterization of hydrothermally-associated minerals in CRISM data with novel analysis methods.
- Analysis of Mars surface hydration using OMEGA and CRISM data.

Research Associate, Friedemann Freund Group, NASA Ames Space Academy, NASA Ames Research Center, Summer 2015

- Conducting experiments relevant to earthquake forecasting research.
- Measuring peroxy defect content of different rock types using Seebeck Effect.
- Modeling radio/microwave propagation through different rock substrates using MATLAB.

- Working to develop radar sounding smallsat system with the rest of NASA Ames Space Academy group.
- Assisting in development of Global Earthquake Forecasting Network by GeoCosmo Science Center.

Research Assistant, Seth Redfield Group, Wesleyan University, Spring 2012-Spring 2016

- Applying Python transit, secondary eclipse, and phase curve model to Kepler & K2 data to characterize of transiting and nontransiting exoplanets.
- Searching for transits of exoplanets orbiting white dwarf stars using the 24" Perkin Telescope.
- Reducing data using customized IDL and IRAF routines.
- Constructing variable input model of a white dwarf exoplanet transit using IDL.
- Constructing model of exoplanet atmosphere Rayleigh scattering using Python.
- Observed and conducted research during summer 2013 through Howard Hughes Research Fellowship.
- Operated WIYN 3.5m telescope at Kitt Peak with Professor Redfield

Research Assistant, James Greenwood Group, Wesleyan University, Spring 2013-Summer 2014

- Synthesized lunar glass using Deltech furnace.
- Analyzing samples with scanning electron microscope and ion microprobe.
- Developing experimental design for testing chondrule formation theory.
- Creating anaerobic furnace environment.

Research Assistant, Reinhold Blümel Group, Wesleyan University, Fall 2012-Summer 2013

- Generated data from numerical simulations of ions in a Paul trap.
- Helped build 3 Beowulf class-supercomputers.

Publications:

- **Tarnas, J. D.**; Mustard, J. F.; Sherwood Lollar, B.; Bramble, M. S.; Cannon, K. M.; Palumbo, A. M.; Plesa, A.-C. Radiolytic H₂ production on Noachian Mars: Implications for habitability and atmospheric warming, *EPSL* 502: 133-145 (2018).
- **Tarnas, J. D.**; Nam, Y. S.; Blümel, R. Universal heating curve of damped Coulomb plasmas in a Paul trap. *Physical Review A* 88, 041401(R) (2013).

Conference Abstracts

- **Tarnas, J. D.**; Mustard, J. F., Sherwood Lollar, B.; Bramble, M.S.; Cannon, K. M.; Palumbo, A. M., Plesa, A.-C. Production of H₂ on Mars Through Radiolysis and Implications for Habitability, *Goldschmidt 2018*, 2018004452.
- **Tarnas, J. D.**; Mustard, J. F., Sherwood Lollar, B.; Bramble, M.S.; Cannon, K. M.; Palumbo, A. M. Radiolytic H₂ Production on Noachian Mars: Implications for Subsurface Habitability, *Fourth Conference on Early Mars*, 3039 (2017).
- **Tarnas, J. D.**; Mustard, J. F.; Sherwood Lollar, B.; Bramble, M. S. Radiolytic Hydrogen Production on Noachian Mars, *LPSC XLVIII*, 2030 (2017).

- **Tarnas, J. D.**; Mustard, J. F.; Sherwood Lollar, B.; Bramble, M. S. Radiolytic Hydrogen Production on Noachian Mars, *AbSciCon 2017*, 3381 (2017).
- Mustard, J. F.; **Tarnas, J. D.** Hydrogen production from the upper 15 km of martian crust via serpentinization: implications for habitability, *LPSC XLVIII*, 2384 (2017).
- **Tarnas, J.**, Redfield, S. Transit, Secondary Eclipse, and Phase Curve Modeling to Characterize Kepler Exoplanet Candidates. *AAS Meeting #227*, 138.14 (2016).
- Persaud, D.; Wu, T.; **Tarnas, J.**; Preudhomme, M.; Jurg, M.; Chalumeau, C.; Buckley, H.; Lombard- Poirot, N. HOMER: A smallsat ground penetrating radar sounding fleet to map planetary surfaces at high resolution, *LPSC XLVII*, 3051 (2016).
- Tregloan-Reed, J.; **Tarnas, J.**, Plante, Z.; Freund, F.; Determination of the amount of peroxy in granite rock using the Seebeck Effect. *AGU Fall Meeting*, 84075 (2015).
- Wu, T.; Persaud, D.; Preudhomme, M.; Jurg, M.; Smith, M.K.; Buckley, H.; **Tarnas, J.**; Chalumeau, C.; Poirot-Lombard, N.; Mann, B. Subsurface Feature Mapping of Mars using a High Resolution Ground Penetrating Radar System. *AGU Fall Meeting*, 76961 (2015).

Chaired Sessions:

Astrobiology I, LPSC 2018.

Relevant Coursework:

Astronomy

Exoplanets

Stellar Structure & Evolution

Radio Astronomy

Galaxies, Quasars & Cosmology

Observational Astronomy

Introductory Astronomy

Planetary Science Seminar

Astronomical Pedagogy

Physics

Thermal/Statistical Physics

Classical Dynamics

Electricity & Magnetism

Computational Physics

Quantum Mechanics I

Electronics Lab

Waves & Oscillations

Special Relativity

Multivariable Calculus
General Physics I & II
Vectors & Matrices

Earth & Planetary Sciences

Kinetics of Geochemical Processes
The Sedimentary Rock Cycle of Earth and Mars
Planetary Cratering
Remote Sensing
TA Planetary Geology
Sedimentation & Stratigraphy
Rheology of the Crust & Mantle
Environmental Geochemistry
Petrology
Physical Volcanology
Mineralogy
Planetary Evolution
Cosmochemistry