CURRICULUM VITAE

Sara Seager
Ellen Swallow Richards Associate Professor of Planetary Science
Associate Professor of Physics
Massachusetts Institute of Technology
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Academic Positions
Ellen Swallow Richards Associate Professor of Planetary Science, MIT, January 2007–present
Associate Professor of Physics, MIT, July 2007–present
Senior Research Staff Member, Carnegie Institution of Washington, August 2002–December 2006
Long-term Member, Institute For Advanced Study, March 2001–August 2002
Member, Institute For Advanced Study, September 1999–March 2001

Education
Ph.D. in Astronomy, Harvard University, September 1999
B.Sc. in Mathematics and Physics, University of Toronto, June 1994

Honors and Awards
John Bahcall Lectureship, STScI and GSFC/HST, 2009
Helen B. Warner Prize, American Astronomical Society, 2007
Bok Prize in Astronomy, Harvard University, 2004
Keck Fellowship, Institute for Advanced Study, 2000-2002
NSERC Science and Technology Fellowship (Canada) 1990-1994

Media Recognition
Discover Magazine: Named in Best 20 under 40, 2008
Popular Science Magazine: Named in Fifth Annual Brilliant Ten, 2006

Visiting Positions
Distinguished Visitor, Spitzer Science Center, Pasadena, CA, December 2008
Dr. H. Lyman Hooker Distinguished Visiting Professor, McMaster University, Canada, March 2009

Current Committees and Service
National Academy of Sciences NRC Committee on the Origin and Evolution of Life 2007-2009
Space Telescope Science Institute Visiting Committee 2006–2008 (Hubble Space Telescope)
Spitzer Science Center Oversight Committee 2008–2010 (Spitzer Space Telescope)
Referee/Reviewer for A&A, ApJ, MNRAS, Nature, Science, NASA, NRC, NSF

Past Committees and Service
NASA/NSF Exoplanet Task Force 2007
JWST Science Assessment Team 2005
National Academy of Sciences Astronomy and Astrophysics Mid Course Review 2004–2005
NSF Optical and Infrared Long Range Planning Committee 2004–2005
NASA Origins Roadmap Committee 2002
Chair, NASA Astrobiology Institute Astronomy Focus Group
National Postdoctoral Fellowship Selection Committees: Hubble Fellowship, Michelson Fellowship,

NASA Fellowships
Grant Panel Reviews for NASA, NSF, and international agencies

Current Exoplanet Mission Activities
NASA/Kepler Participating Scientist
NASA/ASTID Concept Study PI, ExoplanetSat: A Nanosatellite Concept Study to Find Transiting Earth Analogs Around the Nearest Brightest Sun-Like Stars, September 2008-August 2010
NASA Concept Study (eXtrasolar Planet Characterizer, PI Spergel), Science Team Lead, 2008
Support Scientist, Microvariability and Oscillations of Stars (MOST) microsatellite (Canadian Space Agency, launched June 2003)

Past Exoplanet Mission Activities (Scientific Working Groups and Funded Concept Studies)
NASA Terrestrial Planet Finder (TPF) Scientific and Technology Definition Team 2004–2006
NASA TPF Instrument Concept Studies Co-I, Camera Team (CorECam), Spectrograph Team (CorSpec), Starlight Supression System Team (ICS Nulling), 2005–2006
NASA Institute for Advanced Concepts Phase II study of the "New Worlds Imager" Co-I, 2005-2007
All Sky Extrasolar Planet Survey, Scientific Working Group 2005–present
NASA TPF Scientific Working Group 2002–2004
Ball Aerospace TPF architecture study team, June 2000–Dec. 2001
TPF Biomarker Science Working Group, Dec. 2000–Aug. 2001
MUSE microsatellite concept study for the Canadian Space Agency Co-I, Jan. 2001–April 2002

Conference Scientific Organizing Committees
"Towards Other Earths: Perspectives and Limitations in the ELT Era", Portugal, October 2009
"Pathways Towards Habitable Planets", Barcelona, Spain, September 2009
"Characteristics and Habitability of Super Earths", Aspen Center for Physics, August 2008
"Extrasolar Super-Earths", Nantes, France, June 2008
"Transiting Planets", International Astronomical Union (IAU) Symposium 253, Boston, May 2008
"The 4th International TPF/Darwin Workshop", Pasadena, CA, November 2006
"Direct Imaging of Exoplanets", IAU Colloquium 200, France, October 2005
14th Annual Maryland Astrophysics Conference: "The Search for Other Worlds", MD, 2003
Co-Chair for "Scientific Frontiers in Extrasolar Planet Research", Washington DC, June 2002

Professional Memberships
American Astronomical Society
American Geophysical Union

Current Postdoctoral Fellows and Students
Elisabeth Adams, graduate student, Mass-radius relationships for planets with massive atmospheres, MIT/EAPS, January 2007–June 2007, Red noise in exoplanet transit light curves with Magellan, January 2008–present
Eliza Miller-Ricci, graduate student, Super Earth Atmospheres, Harvard/CfA, January 2007–present
Madhu Nikku, graduate student, Exoplanet Atmospheres, MIT/Physics, July 2009–present
Leslie Rogers, graduate student, Mass-radius relationships for planets, MIT/Physics, June 2007–present
Sarah Gelman, MIT/EAPS UROP
Tanmay Kumar, MIT/EAPS/AeroAstro UROP
Sukrit Ranjan, MIT/Physics UROP

Li Zeng, MIT/Physics, UROP, Ambiguities in interior composition for exoplanets with measured masses and radii, summer 2007 to present

Past Postdoctoral Fellows and Students

Feng Tian, MIT Postdoctoral Fellow, Photochemistry and Atmospheric Escape on Exoplanets, MIT/EAPS, July 2008–January 2009

Catherine Hier-Majumder, Carnegie Messenger Postdoctoral Fellow, Interior structure of low-mass exoplanets, 2005-2006 (deceased)

Margaret Turnbull, Carnegie NRC Postdoctoral Fellow, Earthshine Studies of Earth as an Exoplanet, 2004-2006 (currently an astronomer at Global Science Institute)

L. Jeremy Richardson, February, GSFC NRC Postdoctoral Fellow, Observations of hot Jupiters, 2004-2007 (currently working on Capitol Hill)

Kaspar von Braun, Carnegie Postdoctoral Fellow, Planet transit search in open star clusters, October 2002-September 2005 (currently at JPL/IPAC)

Jenny Meyer, graduate student, GJ 436b atmospheres in transmission, MIT/EAPS, January 2007–June 2008

Ben Hood, graduate student, Scattered light signatures from exoplanets, November 2005–January 2007 (currently at AOL)

Eric Ford, graduate research project, Determining properties of Earth-like extrasolar planets from temporal variation, Princeton University, June 2000–August 2001 (currently faculty at University of Florida)

Rudy Santana, MIT/Physics, UROP, Detectability equations for transiting exoplanets, summer 2007

Tyson McNulty, MIT/Materials Science, UROP, Equations of state for planetary interiors, summer 2007

Sonali Shukla, undergraduate research assistant, Spectral signatures of paleoEarth, (New York University) September 2004–present

Jennifer Ortega, Carnegie Summer Intern, Earth-like planets at extreme obliquities, June 2005–August 2005

Karen Horning, Carnegie Summer Intern, Jupiter as an extrasolar planet, June 2003–August 2003

Selected Talks

Invited Conference Talks:

Towards Other Earths: Perspectives and Limitations in the ELT Era, Portugal, October 2009

The Search for Life in the Universe, STScI Symposium, Baltimore, May 2009

NV 400, Beijing, China, October 2008

COSPAR, plenary talk, Montreal, PQ, July 2008

Astrobiology Science Conference, plenary talk, CA, April 2008

American Physical Society plenary talk, St. Louis, MO, April 2008

Harvard Origins Symposium, Cambridge, MA, March 2008

American Astronomical Society plenary talk (Warner Prize Lecture), Texas, January 2008

NASA Planetary Atmospheres Workshop, Baltimore, MD November 2007

Michelson Summer Workshop, CA, July 2007

Gordon Research Conference: Origins of Solar Systems, MA, July 2007

Astrophysics Enabled by the Return to the Moon, STScI, Baltimore, MD, November 2006

The 4th International TPF/Darwin Workshop, Pasadena, CA, November 2006

Pale Blue Dot III, Chicago, September 2006

2006 German/American Frontiers of Science Symposium, National Academy of Sciences,

Germany, June 2006
SPIE Plenary Talk, Astronomical Telescopes and Instrumentation: Probing the Universe from the Ground and Space, May 2006
ISSI Astrobiology Workshop on Strategies of Life Detection, Switzerland, April 2006
ISSI Workshop on Planetary Transits, Switzerland, September 2006
Protoplanets and Stars V (PPV), NASA evening, Hawaii, October 2006
STScI Symposium, A Decade Of Extrasolar Planets Around Normal Stars, Baltimore, MD, May 2005
AAAS Annual Meeting special session on the Transit of Venus, Washington, D. C., February 2005
Bioastronomy 2004: Habitable Worlds, Iceland, July 2004
The Third Harvard-Smithsonian Conference on Theoretical Astrophysics: Astrophysics of Planetary Systems, Cambridge, MA, May 2004
The 14th Annual Maryland Astrophysics Conference: The Search for Other Worlds, University of Maryland, October 2003
AAS Meeting Plenary Talk, Seattle, January 2003
SPIE conference: Future Research Direction and Visions for Astronomy, Hawaii, August 2002
Scientific Frontiers in Research on Extrasolar Planets, Washington DC, June 2002
Astrophysics of Life Conference, Space Telescope Science Institute, Baltimore, May 2002
Rubin Symposium, Washington DC, January 2002
The Challenge of High Resolution X-Ray to IR Spectroscopy, University of Kentucky, Lexington, November 2001
From Giant Planets to Cool Stars, Flagstaff, May 1999

Astronomy, Planetary Science, Geophysics (g), or Physics (p) Colloquia and Seminars(*)
2009: Berkeley, McMaster University (Canada), Princeton University[g], Queens University[p] (Canada), McGill University (Canada)
2008: American Museum of Natural History, Aspen Center for Physics[p], Boston University, JPL[*], MIT[p], Princeton, Spitzer Science Center
2007: Caltech[g], Max Planck (Munich), U Mass(Amherst), University of Waterloo (Canada)
2006: Harvard University[g], MIT (EAPS), Penn State University
2005: Columbia University, NASA/GSFC[*], NIST[*], STScI
2004: Fermilab[*], Harvard University, Johns Hopkins University, MIT, Ohio State University
2003: Carnegie/DTM, NASA/GSFC[*], NASA/Ames[*], NRAO, University of Pennsylvania[p], UCLA
2002: Caltech[*], Cornell, ESO[*] (Chile), Harvard University[*], IfA Hawaii, University of Maryland
2001: American Museum of Natural History[*], Berkeley, Carnegie DTM, Carnegie Observatories, Institute for Advanced Study, Princeton, University of Arizona, University of Delaware, University of Toronto
2000: Institute for Advanced Study, Penn State, Rutgers[*], University of British Columbia, University of Pennsylvania[*], University of Washington (Seattle)

Public Talks
2009: Isaac Asimov Debate, Hayden Planetarium, New York;
International Year of Astronomy Kick Off, Royal Military College, Kingston, Ontario;
Frontiers of Science Lecture Series, Penn State, State College, Pensylvannia;
Exploring Space Series, National Air and Space Museum, Washington, DC
2008: IDEAS Boston; The Aspen Institute, Colorado; Hayden Planetarium, New York
2004: National Air and Space Museum, Washington, DC

2003: NSF Symposium "The Universe from the Ground Up", Ground-based Astronomy in the 21st Century Washington, DC, October 2003
2002: Joint Royal Canadian Institute and Royal Astronomical Society of Canada

Papers Submitted to Refereed Journals

Madhusudhan, N., & **Seager, S.** 2009, "A Temperature and Abundance Retrieval Method for Exoplanet Atmospheres", submitted to ApJ.

Miller-Ricci, E., Meyer, M., **Seager, S.**, & Elkins-Tanton, L. "On the Possibility of Detecting Hot Protoplanet Collision Afterglows", submitted to ApJ.

Publications in Refereed Journals

Seager, S., & Deming, D. "On the Method to Infer an Atmosphere on a Tidally-Locked Super Earth Exoplanet and Upper limits to GJ 876d", ApJ, in press.

Miller-Ricci, E., **Seager, S.**, & Sasselov, D. 2009 "The Atmospheric Signatures of Super-Earths: How to Distinguish Between Hydrogen-Rich and Hydrogen-Poor Atmospheres", ApJ, 690, 1056-1067.

Rowe, J. F., Matthews, J. M., **Seager, S.**, et al. 2008, "The Very Low Albedo of an Extrasolar Planet: MOST Spacebased Photometry of HD 209458", ApJ, 689, 1345-1353.

Elkins-Tanton, L., & **Seager, S.** 2008, "Coreless Terrestrial Exoplanets", ApJ, 688, 628-635.

Elkins-Tanton, L., & **Seager, S.** 2008, "Range of Masses and Atmospheric Composition for Terrestrial Exoplanets", ApJ, 685, 1237-1246.

Zeng, Li, & **Seager, S.** 2008, "A Computational Tool to Interpret the Bulk Composition of Solid Exoplanets Based on Mass and Radius Measurements", PASP, 120, 983-991.

Hood, B., Wood, K., **Seager, S.**, Collier-Cameron, A. 2008, "Reflected Light from 3D Exoplanetary Atmospheres and Simulation of HD 209458b, MNRAS, 389, 257-269.

Rauscher, E., Menou, K., Cho, J. Y.-K., **Seager, S.** 2008, "On Signatures of Atmospheric Features in Thermal Phase Curves of Hot Jupiters", ApJ, 681, 1646-1652.

Adams, E. R., **Seager, S.**, & Elkins-Tanton, L. 2008, "Ocean Planet or Thick Atmosphere: On the Mass-Radius Relationship for Solid Exoplanets with Massive Atmospheres, ApJ, 673, 1160-1164.

Palle, E., Ford, E. B., **Seager, S.**, Montanes-Rodriguez, P., & Vazquez, M. 2008, "Identifying the Rotation Rate and the Presence of Dynamic Weather on Extrasolar Earth-like Planets from Photometric Observations", ApJ, 676, 1319-1329.

Seager, S., Kuchner, M., Hier-Majumder, C. A., & Militzer, 2007, "Mass-Radius Relationships for Solid Exoplanets", ApJ, 669, 1279-1297.

Deming, D., Harrington, J., Laughlin, G., **Seager, S.**, Navarro, S. B., Bowman, W. C., Horning, K. 2007, "*Spitzer* Transit and Secondary Eclipse Photometry of GJ 436", ApJ, 667, L199-202.

Lopez-Morales, M. & **Seager, S.**, 2007, "Thermal Emission from Transiting Very-Hot Jupiters: Prospects for Ground-based Detection at Optical Wavelengths", ApJ, 667, L191-194.

Rauscher, E., Menou, K., **Seager, S.**, Deming D., Cho, J. Y.-K., Hansen, B. M. S. 2007, "Toward Eclipse Mapping of Hot Jupiters", ApJ, 664, 1199-1209.

Harrington, J., Luszcz, S., **Seager, S.**, Deming, D., Richardson, L. J. 2007, "The Hottest Planet", Nature, 447, 691-693.

Richardson, L. J., Deming, D., Horning, K., **Seager, S.**, & Harrington, J. 2007, "A Spectrum of an Extrasolar Planet", Nature, 445, 892-895.

Lopez-Moralez, M. Morell, N. I., Butler, R. P., & **Seager, S.** 2006, PASP, "Limit to Transits of the Neptune-Mass Planet Orbiting Gl 581", PASP, 118, 1506-1509.

Harrington, J., Hansen, B. M. S., Luszcz, S., **Seager, S.**, Deming, D., Menou, K., Cho, J. Y.-K., & Richardson, L. J. 2006, "The Phase-Dependent Infrared Brightness of the Extrasolar Planet υ Andromedae b", Science, 314, 623-626.

Richardson, L. J., Harrington, J. **Seager, S.**, & Deming, D. 2006, "A *Spitzer* Infrared Radius for the Transiting Extrasolar Planet HD 209458b", ApJ, 649, L1043-1047.

Rowe, J. F., Matthews, J. M., **Seager, S.**, Kuschnig, R., Guenther, D. B., Moffat, A. F. J., Rucinski, S., Sasselov, D. D., Walker, G. A. H. 2006, "An Upper Limit on the Albedo of HD 209458b: Direct Imaging Photometry with the MOST Satellite", ApJ, 646, 1241-1251.

Deming, D., Harrington, J., **Seager, S.**, & Richardson, L. J. 2006, "Strong Infrared Emission from the Extrasolar Planet HD 189733b", ApJ, 644, 560-564.

Wong, W. Y., **Seager, S.**, & Scott, D. 2006, "Spectral Distortions to the Cosmic Microwave Background from the Recombination of Hydrogen and Helium", MNRAS, 367, 1666-1676.

Seager, S., Richardson, L. J., Hansen, B. M. S., Menou, K, Cho, J., & Deming, D. 2005, "On the Day Side Thermal Emission of Hot Jupiters", ApJ, 632, 1122-1131.

Seager, S., Turner, E. L., Schafer, J., & Ford, E. B. 2005, "Vegetation's Red Edge: A Possible Biomarker of Extraterrestrial Plants", Astrobiology, 5, 372-390.

Deming, D., **Seager, S.**, Richardson, L. J., & Harrington, J. 2005, "Detection of Infrared Radiation from an Extrasolar Planet", Nature, 434, 740-743.

Gaudi, B. S., **Seager, S.**, & Mallen-Ornelas, G. 2004, "On the Period Distribution of Close-In Extrasolar Giant Planets", ApJ, 623, 472-481.

von Braun, K., Lee, B. L., **Seager, S.**, Yee, H. K. C., Mallen-Ornelas, G., & Gladders, M. D. 2004, "Searching for Planetary Transits in Galactic Open Clusters: EXPLORE/OC", PASP, 117, 141-159.

Dyudina, U. A., Sackett, P. D., Bayliss, D. D. R., **Seager, S.**, Porco, C. C., Throop, H. B., & Dones, L. 2005, "Phase Light Curves for Extrasolar Jupiters and Saturns", ApJ, 618, 973-986.

Liang, M.-C., **Seager, S.**, Parkinson, C. D., Lee, A. Y.-T., & Yung, Y. L. 2004, "On the Insignificance of Photochemical Hydrocarbon Aerosols in the Atmospheres of Close-in Extrasolar Giant Planets" ApJ, 605, L61-64.

Danchi, W. C., Deming, D., Kuchner, M. J., & **Seager, S.** 2003, "Detection of Close-In Extrasolar Giant Planets Using the Fourier-Kelvin Stellar Interferometer", ApJ, 597, L57-60.

Green, D., Matthews, J. M., **Seager, S.**, Kuschnig, R. 2003, "MOST's Potential to Detect and Characterize Scattered Light from Extrasolar Planets", ApJ, 597, 590-601.

Richardson, L. J., Deming, D., & **Seager, S.** 2003, "Infrared Observations During the Secondary Eclipse of HD209458b II. Strong Limits on the Infrared Spectrum Near 2.2 Microns", ApJ, 597, 581-589.

Liang, M.-C., Parkinson, C. D., Lee, A. U.-T., Yung, Y. L., & **Seager, S.** 2003, "Source of Atomic Hydrogen in the Atmosphere of HD209458b", ApJ, 596, L247-250.

Menou, K., Cho, J. Y-K., **Seager, S.**, & Hansen, B. 2003, "Weather Variability of Close-in Extrasolar Giant Planets", ApJ, 587, L113-116.

Cho, J. Y-K., Menou, K., Hansen, B., & **Seager, S.** 2003, "The Changing Face of the Extrasolar Giant Planet HD209458b", ApJ, 587, L117-120.

Seager, S. 2003, "The Search for Earth-like Extrasolar Planets", E&PSL (Frontiers), 208, 113-124.

Seager, S., & Mallen-Ornelas, G. 2003, "On the Unique Solution of Planet and Star Parameters from an Extrasolar Planet Transit Light Curve", ApJ, 585, 1038-1055.

Mallen-Ornelas, G., **Seager, S.**, Yee, H. K. C., Minniti, D., Gladders, M., Mallen-Fullerton, G., & Brown, T. 2003, "The EXPLORE Project I: A Deep Search for Transiting Extrasolar Planets", ApJ, 582, 1123-1140.

Des Marais, D. J., Harwit, M., Jucks, K., Kasting, J. F., Lunine, J. I., Lin, D., **Seager, S.**, Schneider, J., Traub, W., & Woolf, N. 2002, "Remote Sensing of Planetary Properties and Biosignatures on Extrasolar Terrestrial Planets", Astrobiology, 2, 153-181.

Seager, S., & Hui, L. 2002,"Constraining the Rotation Rate of Transiting Extrasolar Planets by an Oblateness Measurement", ApJ, 574, 1004-1010.

Hui, L., & **Seager, S.** 2002, "Atmospheric Lensing and Oblateness Effect During an Extrasolar Planetary Transit", ApJ, 572, 540-555.

Gurfil P., Kasdin, J., Arrell, R., **Seager, S.**, & Nissanke, S. M. 2002, "Infrared Space Observatories: How to Mitigate Zodiacal Dust Intereference", ApJ, 567, 1250-1261.

Marley, M. S., **Seager, S.**, Saumon, D., Lodders, K, Ackerman, A. S., Freedman, R., & Fan, X. 2002, "Clouds and Chemistry: Ultracool Dwarf Atmospheric Properties from Optical and Infrared Colors", ApJ, 568, 335-342.

Ford, E. B., **Seager, S.**, & Turner, E. L. 2001, "Characterization of Extrasolar Terrestrial Planets from Diurnal Photometric Variability", Nature, 412, 885-887.

Seager, S., Whitney, B. A., & Sasselov, D. D. 2000, "Light Curves and Polarization of the Close-in Extrasolar Giant Planets", ApJ, 540, 504-520.

Peebles, P. J. E., **Seager, S.**, & Hu, W. 2000, "Delayed Recombination", ApJ, 539, L1-4.

Seager, S., & Sasselov, D. D. 2000, "Theoretical Transmission Spectra During an Extrasolar Giant Planet Transit", ApJ, 537, 916-921.

Seager, S., Sasselov, D. D., & Scott, D. 2000, "How Exactly Did the Universe Become Neutral?", ApJS, 128, 407-430.

Seager, S., Sasselov, D. D., & Scott, D. 1999, "A New Calculation of the Recombination Epoch", 1999, ApJ, 523, L1-5.

Seager, S., & Sasselov, D. D. 1998, "Extrasolar Giant Planets Under Strong Stellar Irradiation", ApJ, 502, L157-161.

Fernie, J. D., & **Seager, S.** 1995, "V441 Herculis (89 Her) and V814 Herculis (HD 161796) in 1993 and 1994", PASP, 107, 853-855.

Fernie, J. D., Khoshnevissan, M. H., & **Seager, S.** 1995 "Secular Changes in the Classical Cepheid Y Ophiuchi", AJ, 110, 1326-1332.

Fernie, J. D., & **Seager, S.** 1994, "R Coronae Borealis in 1992 and 1993", PASP, 106, 1138-1140.

Fernie, J. D., Kamper, Karl W., & **Seager, S.** 1993, "Goodbye to Polaris the Cepheid", ApJ, 416, 820-824.

Zsoldos, E., Fernie, J. D., Arellano-Ferro, A., & **Seager, S.** 1993, "The Double-mode Semiregular Variable UU-Herculis - 1990-1992 Photometry", A&A, 275, 484-488.

Fernie, J. D., & **Seager, S.** 1993, "V441 Herculis (89 Herculis) and V814 Herculis (HD 161796) in 1991 and 1992", PASP, 105, 751-754.

Popular Articles

S. Seager 2008, "Alien Earths from A to Z", Sky and Telescope, 115, 22.

S. Seager 2006, "Unveiling Distant Worlds", Sky and Telescope, 111, 28-34.

Books

Deming, D., & **Seager, S.** eds. 2003, "Scientific Frontiers in Research on Extrasolar Planets", ASP Conf. Ser. 294 (San Fransisco: ASP).