

Howard Chen

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EDUCATION

- **Northwestern University** Evanston, IL
PhD in Earth & Planetary Sciences Sept. 2016 – Present
- **Boston University** Boston, MA
Bachelor of Arts in Physics Sept. 2012 – May. 2016

RESEARCH INTERESTS

- **Climate Modeling:** Use and Modification of High-Top 3D Earth-System Climate Models
- **Astrobiology:** Biosignatures and Habitability of Early Earth and Habitable Zone Exoplanets
- **Atmospheric Evolution:** Early Atmospheric Evolution of Earth, Young Solar XUV Irradiation, Oxygen Concentration

RECENT AWARDS

- **Future Investigators in NASA Earth and Space and Technology** \$145,000 Total Funding
Three-year project using 3D coupled chemistry-climate models to study rocky exoplanets Sept 2019 - Present
- **Horace A. Scott Graduate Research Excellence** \$2,000 Scholarship
Northwestern University Department of Earth & Planetary Sciences Internal Award June 2020
- **American Geophysical Union (AGU) Outstanding Student Presentation** 2% selection
Awarded by the American Geophysical Union Fall 2019 Meeting December 2019
- **Boston University Undergraduate Research Opportunities Program (×3)** \$5,000 Total Funding
Undergraduate grant for research projects during the school year and the summer semester 2014-2016
- **Caltech Summer Undergraduate Research Fellowship (SURF)** \$6,000 Funding
Summer project with Dr. Leslie Rogers, facilitated by Drs. Phil Muirhead and Heather Knutson Summer 2014
- **Boston University Student Academic Enhancement Fund Travel Grant** \$800 Funding
Undergraduate Travel Grant to the 2013 American Geophysical Union Fall Meeting December 2013

REFEREED PUBLICATIONS

- Howard Chen, Michael Mendillo, Juliette C. Becker, Daniel E. Horton, ‘On the Ionospheres of Strongly- to Weakly-Oxygenated Terrestrial Exoplanets,’ In Prep
- Howard Chen, Zhuchang Zhan, Allison Youngblood, Eric T. Wolf, Adina D. Feinstein, Daniel E. Horton, ‘Enhanced and Persistent Flare Driven Bio-indicating Chemistry on Synchronously-Rotating Rocky Worlds,’ Under Review
- Howard Chen, Eric T. Wolf, Zhuchang Zhan, Daniel E. Horton, ‘Habitability and Spectroscopic Observability of Warm M-dwarf Exoplanets Evaluated with a 3D Chemistry-Climate Model,’ *The Astrophysical Journal*, Volume 886, Issue 1, (2019)
- Howard Chen, Eric T. Wolf, Ravi Kopparapu, Shawn D. Domagal-Goldman, Daniel E. Horton, ‘Biosignature Anisotropy Modeled on Temperate Tidally Locked M-dwarf Planets,’ *The Astrophysical Journal Letters*, Volume 868, Issue 1, article id. L6, 9 pp. (2018)
- Howard Chen and Leslie Rogers, ‘Evolutionary Analysis of Gaseous Sub-Neptune-Mass Planets with MESA,’ *The Astrophysical Journal*, 831, Issue 2, 180, 18 pp. (2016)

- Howard Chen, John C. Forbes, Abraham Loeb ‘Habitable Evaporated Cores and the Occurrence of Panspermia near the Galactic Center,’ *The Astrophysical Journal Letters*, 855, Issue 1, L1, 6 pp. (2018)
- James F. Kasting, Howard Chen and Ravi Kopporapu, ‘Stratospheric Temperatures and Water Loss in the Moist Greenhouse Atmospheres of Earth-like Planets,” *The Astrophysical Journal Letters*, 813, Issue 1, L3, 4 pp. (2015)
- Rebecca C Payne, Amber V Britt, Howard Chen, James F Kasting, David C Catling, ‘The response of Phanerozoic surface temperature to variations in atmospheric oxygen concentration,’ *Journal of Geophysical Research*, Volume 121, Issue 11, 10.1002, (2016)
- Everett Schlawin, Ming Zhao, Howard Chen, and +3 other contributing authors ‘Reduced Activity and Large Particles from the Disintegrating Planet Candidate KIC 12557548b,” *The Astrophysical Journal*, 826, Issue 2, 156, 13 pp. (2016)

TALKS & SEMINARS (INVITED + CONTRIBUTED)

- **Invited American Geophysical Union 2020 Union SEED session talk** Virtual Talk
'On the Ionospheres of Strongly- to Weakly-Oxygenated Terrestrial Exoplanets' December 2020
- **University of Chicago Exoplanet Journal Club** Chicago, IL
'Influence of Stellar Flares and Coronal Mass Ejections on the Atmospheres of Tidally-Locked Planets' Sept 30th 2019
- **American Astronomical Society (AAS) CIERA Extreme Solar Systems IV** Reykjavik, Iceland
'M-dwarf Activity Driven 3D Climate and Photochemistry of Inner Habitable Zone Planets' Aug 23rd 2019
- **2019 Astrobiology Science Conference** Seattle, WA
'Coupled 3D Chemistry-Climate Simulations of Moist Greenhouse Terrestrial Planets' June 25th 2019
- **Academia Sinica Institute of Astronomy and Astrophysics (ASIAA)** Taipei, Taiwan
'From Earth to Super-Earths: Modeling Optically Thick and Thin Planetary Atmospheres' July 11th 2016
- **Harvard-Smithsonian CfA Small-Scale Phenomenon Seminar** Cambridge, MA
'From Sub-Neptunes to Earth-like Exoplanets: Modeling Thick and Thin Planetary Atmospheres' Sept 28th 2015

INVITED BOOK CHAPTERS

- **Planet Formation and Panspermia; Editor: Branislav Vukotic** Wiley-Scrivener Publishing LLC
Tentative Chapter Title: *Panspermia at the Center of Spiral Galaxies* In Prep

TEACHING & MENTORING EXPERIENCE

- **Class Assistant for EARTH 340 Physics of Weather and Climate** Fall 2019
Held office hours, lead discussion and lectures, answering grading questions
- **Teaching Assistant for EARTH 110 Exploration of the Solar System** Spring 2019
Departmental TA, received 25 praises and comments in the evaluation form
- **Discussion Assistant and Grader for EARTH 351 Forming a Habitable Planet** Spring 2017
Lead homework discussion and helped with grading, gave one presentation on planet formation
- **Mentor for two students on individual research projects** Summer 2019 - 2020
Allen Gu, High School Student, Project: Exoplanetary Ozone Rachel Fry, REU Student, Project: In Progress

OUTREACH

- **CIERA High School Summer Research Experience in Astronomy 2020** Evanston, IL
Mentors lead separate projects each week, gave two presentations over Zoom June 29th – August 7th, 2020
- **CIERA High School Summer Research Experience in Astronomy 2019** Evanston, IL
Mentored a student on a project, looked after students throughout the program duration June 24th – August 9th, 2019
- **Skype A Scientist** Virtual
Three separate K-12 classrooms, entitled "Are we alone in the Universe?" April 2020 - Present
- **Ask-an-Expert Event at Niles North High School** Niles, IL
Series of presentations talking about who I am and how I came to me, answer student questions November 2019 - Present
- **STEAM Academy at Benavides** Aurora, IL
Taught students about my path to be a scientist and general descriptions of my research April 25th, 2018
- **Only One Sky** Chicago, IL
Created lesson plans for K-12 teachers, example link: <http://skydayproject.com/stars/> 2017 - Present
- **Cheyenne River Sioux Native American Reservation Youth Project** Eagle Butte, SD
Volunteering work at a Teen Center, hosted series of "Science Cafes" about Carl Sagan Summer 2011 - 2012

PROGRAMMING SKILLS

- **Languages:** Python, FORTRAN, NCL, C++ **Codes:** CESM, Atmos, MESA