Xuan Ji

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Education

2022–26 (expected)	**Ph.D. candidate**, Geophysical Sciences,	The University of Chicago
2020–22	**Ph.D. student**, Geophysical Sciences,	The University of Chicago
2016–20	**B.S. with honors**, Astronomy,	Beijing Normal university

Research Interests

Exoplanets, Climate [C] , Volatiles [V], Orbital Dynamics [O]: I am broadly interested in how the formation history and orbital evolution of exoplanets shape their potential habitability. My current research focuses on climate with varying orbits and atmospheric retention. My long-term goal as a researcher is to identify the typical types of planetary system architectures that favor habitability.

Publications

Google Scholar

0. [C] [O] **Ji, Xuan** & Abbot, D. Climate Regime Transitions Driven by Variable Eccentricity. *(in prep).*
0. [C] **Ji, Xuan** & Abbot, D. Land Heat Stress on Eccentric Planets is Limited by Oceanic Influence via Atmospheric Circulation. *(in prep).*
1. [C] **Ji, Xuan** & Abbot, D. Snowball Bistability Vanishes at Moderate Orbital Eccentricity (submitted to PSJ). *arXiv:2509.08994* (2025).
2. [V] **Ji, Xuan**, Chatterjee, R., Coy, B. P. & Kite, E. The Cosmic Shoreline Revisited: A Metric for Atmospheric Retention Informed by Hydrodynamic Escape (Accepted by ApJ). *arXiv:2504.19872* (2025).
3. [C] **Ji, Xuan**, Bailey, N., Fabrycky, D., Kite, E. S., Jiang, J. H. & Abbot, D. Inner Habitable Zone Boundary for Eccentric Exoplanets. *The Astrophysical Journal Letters* **943,** L1 (2023).
4. [C] Williams, D. A., **Ji, Xuan**, Corlies, P. & Lora, J. M. Clouds and Seasonality on Terrestrial Planets with Varying Rotation Rates. *ApJ* **963,** 36 (2024).
5. Jiang, J. H., **Ji, Xuan**, Cowan, N., Hu, R. & Zhu, Z. Empirical Predictions for the Period Distribution of Planets to Be Discovered by the Transiting Exoplanet Survey Satellite. *AJ* **158,** 96 (2019).
6. [V] Gu, J. T., Peng, B., **Ji, Xuan**, Zhang, J., Yang, H., Hoyos, S., Hirschmann, M. M., Kite, E. & Fischer, R. A. Composition of Earth's initial atmosphere and fate of accreted volatiles set by core formation and magma ocean redox evolution. *Earth and Planetary Science Letters* **629,** 118618 (2024).
7. Jiang, J. H., Burn, R., **Ji, Xuan**, Fahy, K. A. & Eggenberger, P. Angular momentum distributions for observed and modeled exoplanetary systems. *ApJ* **924,** 118 (2022).
8. Jiang, J. H., Zhao, D., **Ji, Xuan**, Xie, B. & Fahy, K. A. Revisiting the planet mass and stellar metallicity relation for low-mass exoplanets orbiting GKM class stars. *Universe* **7,** 88 (2021).
9. [V] Xue, Q., Zhang, M., Park Coy, B., Brady, M., **Ji, Xuan**, *et al.* The JWST Rocky Worlds DDT Program reveals GJ 3929b to likely be a bare rock. arXiv: 2508.12516 (2025).
10. Cao, S., Biesiada, M., Qi, J., *et al.* (includes X. Ji). Cosmological investigation of multi-frequency VLBI observations of ultra-compact structure in z 3 radio quasars. *Eur. Phys. J. C* **78,** 749 (2018).
11. Liu, T., Cao, S., Zhang, J., *et al.* (includes X. Ji). Implications from simulated strong gravitational lensing systems: constraining cosmological parameters using Gaussian Processes. *ApJ* **886,** 94 (2019).

Seminars

S1. *[V] The Cosmic Shoreline Revisited* Caltech Planetary Science Seminar (Pasadena, CA). Apr. 2025.

S2. *[V] The Cosmic Shoreline Revisited* Caltech YLY Lunch Seminar (remote). Feb. 2025.

S3. *[O] Sweeping Secular Resonance to Explain the Super Earth-Cold Jupiter Configuration* Tsinghua University Planet group meeting (Beijing, China). Nov. 2020.

Conference Presentations

P1. *[C] Role of Atmospheric Dynamics on Subtropical Heat Stress.* AGU (Washington, D.C.) Dec. 2024.

P2. *[C] [O] Variable Eccentricity-Driven Snowball Bifurcation* ExSS V (Christchurch, NZ). Dec. 2024.

P3. *[C] The Inner Edge of Habitable Zone for Eccentric Exoplanets.* AGU (Chicago, IL). Dec. 2022.

Teaching

2021-25 (yearly)	Lecturer	Global Warming (GEOS 13410)
2024/25	TA	Getting Something For Nothing (PHSC 11900)
2024	TA	Geophysical Fluid Dynamics: Rotation and Stratification (GEOS 24240)
2023	TA	The Atmosphere (GEOS 13300)
2022	TA	Earth as a Planet: Exploring Our Place in the Universe (PHSC 10800)

Academic Service

2025	Journal Reviewer for The Planetary Science Journal
2025	Journal Reviewer for Monthly Notices of the Royal Astronomical Society

Service & Science Communication

2025	Interviewer	Popular science video about K2-18 b (in Chinese), Bilibili
2024-25	Host Scientist	Astronomy Conversations at Adler Planetarium, Chicago, IL
2024	Co-Host	Exoplanets Journal Club, Chicago, IL
2024 Jul	Co-Organizer	Rossbypalooza Summer School, Chicago, IL
2023 May	Co-Organizer	GeoSci Grad Expo, Chicago, IL
2023 Fall	Mentor	Girls Invent Program, Chicago, IL
2023 Spring	Volunteer Math Tutor	Chicago Public Schools, Chicago, IL
2023/24 Mar	Co-Organizer	Earth Science Day for High School Students, Chicago, IL
2022/23	Activity Designer	South Side Science Festival, Chicago, IL
2018	Astronomy Editor	Hippo Starry Sky Blog, Beijing, China

Awards & Honors

2025	CESASC JHJ Prize for Fundamental Science
2019	Top 10 Outstanding Undergraduates in Beijing Normal University
2019	First prize in Linbridge Prize for Excellent Undergraduate Research
2018	National Scholarship

Tools & Software

- **Box Models Developed:**
  - Single-species atmospheric escape models coupled with magma oceans
  - Two-layer, ice-thermodynamic, latitude-resolved Energy Balance Model coupled with ZKL oscillations
- **Models Used:** 3D GCMs: (ExoCAM, CESM1, Isca); N-body: (REBOUND); radiative transfer: (Clima,HELIOS)

Last updated: September 15, 2025