

Xuan Ji

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Education

2020–26 (expected)	Ph.D. student	Geophysical Sciences	The University of Chicago
		<i>Thesis: The Effect of Constant and Varying Eccentricity on Planetary Climate and Habitability</i>	
2016–20	B.S. with honors	Astronomy	Beijing Normal University

Research Interests

Planetary Climates [C], **Exoplanet Atmospheric Evolution [A]**, **Orbital evolution [O]**: I am interested in how the formation history and orbital evolution of exoplanets shape their potential habitability. My current research focuses on: (1) how planetary climates respond to varying orbital configurations, and (2) how atmospheres are gained, lost, or retained. My long-term goal is to identify which planetary system architectures are most likely to produce and sustain habitable planets.

Publications

 [Google Scholar](#) / [ADS Library](#) /  [0000-0002-1592-7832](#)

- **[C]** **Ji, Xuan** & Abbot, D. S. Mean Stellar Flux Approximation for Eccentric Exoplanets Modified by Clouds and Atmospheric Dynamics. (in prep).
 - **[C]** **[O]** **Ji, Xuan** & Abbot, D. S. Climate Regime Transitions Driven by Variable Eccentricity. (in prep).
1. **[A]** **Ji, Xuan**, Chatterjee, R., Coy, B. P. & Kite, E. The Cosmic Shoreline Revisited: A Metric for Atmospheric Retention Informed by Hydrodynamic Escape. *ApJ* **992**, 198 (2025).
 2. **[C]** **Ji, Xuan** & Abbot, D. Snowball Bistability Vanishes at Moderate Orbital Eccentricity. *PSJ* **6**, 296 (2025).
 3. **[C]** **Ji, Xuan**, Bailey, N., Fabrycky, D., Kite, E. S., Jiang, J. H. & Abbot, D. Inner Habitable Zone Boundary for Eccentric Exoplanets. *ApJL* **943**, L1 (2023).
 4. **[A]** 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. *EPSL* **629**, 118618 (2024).
 5. **[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).
 6. 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).
 7. 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).
 8. 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).
 9. **[A]** 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 (accepted by ApJL). 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).

Tools & Software

- **Models Developed:**
 - [\[A\]](#) Single-species atmospheric escape models coupled with magma oceans
 - [\[C\]\[O\]](#) Two-layer, ice-thermodynamic, latitude-resolved Energy Balance Model coupled with ZKL cycle
 - [\[O\]](#) Sweeping Secular Resonance Solver (both analytical and numerical)
- **Models Used:** GCMs: ([ExoCAM](#), [CESM1](#), [Isca](#)); N-body: ([REBOUND](#)); radiative transfer: ([Clima](#), [HELIOS](#))

Seminars

- S1. [\[A\]](#) *The Cosmic Shoreline Revisited* [Caltech Planetary Science Seminar](#) (Pasadena, CA). Apr. 2025.
- S2. [\[A\]](#) *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.

Selected Conference Presentations

- P1. [\[C\]](#) *Subtropical amplified 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	Executive Secretary	NASA Review Panel
2025	Journal Reviewer	PSJ and MNRAS
2024	Co-Host	Exoplanets Journal Club at UChicago
2024 Jul	Co-Organizer	Rosshypalooza Summer School at UChicago
2023 May	Co-Organizer	GeoSci Grad Expo at UChicago

Selected Outreach & Science Communication

2025/07/05	Interviewer	Popular science video about K2-18 b (in Chinese)	Bilibili
2024-25	Host Scientist	Astronomy Conversations at Adler Planetarium	Chicago, IL
2023/11/13	Speaker&Mentor	Girls Advancing in STEM Conference	Chicago IL
2023 Fall	Mentor	Girls Invent Program	Chicago, IL
2023/03/25	Mentor	EYH STEM conference for middle-school girls	Chicago IL
2023 Spring	Math Tutor	Wendell Phillips Academy (Chicago Public School)	Chicago, IL
2023(24)/03	Co-Organizer	Earth Science Day for High School Students	Chicago, IL
2022(23)/09	Activity Designer	South Side Science Festival	Chicago, IL
2019/02	Teacher	Yayasan Widya Guna	Bali, Indonesia
2018-19	Astronomy Editor	Hippo Starry Sky Blog	Beijing, China

Selected 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